The World's Work

ARTHUR W. PAGE, EDITOR

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THE COUNCIL OF NATIONAL DEFENSE AND ITS ADVISORY COMMISSION

Upon which rests the chief responsibility for defense. From left to right: Mr. Julius Rosenwald, President of Sears, Roebuck & Company, of Chicago, Mr. Bernard M. Baruch, a stock broker of New York, Dr. Hollis Godfrey, President of Drexel Institute, of Philadelphia, Mr. Daniel Willard, President of the Baltimore & Ohio Railroad, Mr. William B. Wilson, Secretary of Labor, Mr. David F. Houston, Secretary of Agriculture, Mr. Howard E. Coffin, Vice-president of the Hudson Motor Car Company, of New York, Mr. Josephus Daniels, Secretary of the Navy, Dr. Franklin H. Martin, Secretary of the American College of Surgeons, of Chicago, Mr. Newton D. Baker, Secretary of War, Mr. William C. Redfield, Secretary of Commerce, and Mr. Samuel Gompers, President of the American Federation of Labor. The only member of the Council missing from the picture is Secretary of the Interior Franklin K. Lane

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THE
WORLD'S WORK

APRIL, 1917

VOLUME XXXIII NUMBER 6

THE MARCH OF EVENTS

THE war is coming to its fourth summer and little by little the ultimate end becomes plainer. The Kaiser still faces an unbeaten Russian line on the East and an increasingly aggressive line of French and English on the West. He has beaten the small nations that joined the Allies but he is further removed from a decisive victory than ever. The grip of the British blockade is weakening the vital forces of his Empire. His schemes of revolution in French and English dependencies have all failed. The efforts for a separate peace with various different enemies have met a like fate. Two strenuous efforts to destroy Great Britain's life blood by submarine attack have failed. The third attempt now in operation has little more chance of decisive results. The loss of tonnage it is causing is serious but not vital, and the attendant loss of submarines is too large to make the renewed campaign permanent. The battle off Jutland proved that the Kaiser's above-water navy could not break the blockade.

What is left? A decisive victory on land or a decisive victory at sea. If the Warsaw campaign did not break the Russian army or Verdun defeat the French, the chances of a decisive German success are much less now. If the battle off Jutland which the Kaiser hailed as a victory did not open the sea to the German fleet, what better chance will it have in a second encounter?

The Kaiser may still hope for a successful defense of his conquests, but the hope can hardly be optimistic, for he faces an ever increasing efficiency in stubborn and patient foes who have it burned into their souls that anything short of victory is defeat. And the Kaiser must face them with a faltering credit and a shortage of food and materials.

The Kaiser faces the dismemberment of his dream of world empire and the end of a personal power that has for many years threatened civilization with the present war. He is another of the long line of reactionary figures who have taken the feudal doctrines of the Middle Ages and tried to drive back the irresistible growth of individual rights and human liberty. George III was a small character and stupid. Napoleon the First was a magnificent tyrant. Napoleon the Third was scheming and petty. But none of these, though they lived in supposedly less civilized times, ever descended to the inhuman and the conscienceless beliefs and practices which the Kaiser has adopted to reach his ends. In modern times he stands alone of all rulers, either of those who inherited power or those who acquired it by their own abilities — damned in a class by himself.

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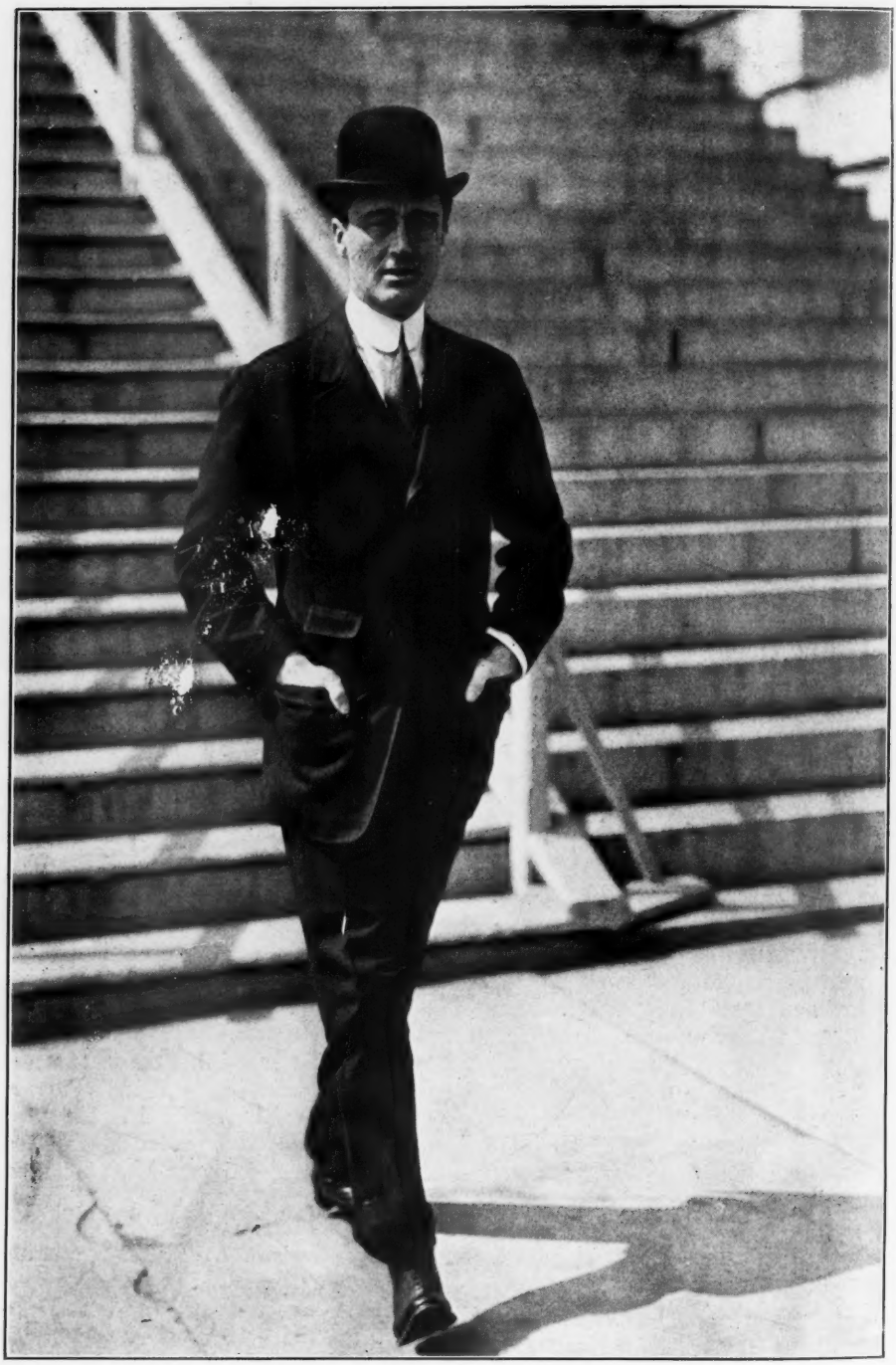
Council of National Defense: Daniel Willard, Chairman, President of the Baltimore & Ohio Railroad; Howard E. Coffin, Vice-Chairman, Hudson Motor Car Co.; Franklin K. Lane, Secretary of the Interior; Julius Rosenwald, of Chicago; Dr. Hollis Godfrey, Director of Munitions, Commonwealth of Pennsylvania; Bernard M. Baruch, of New York; Dr. Stanford Bursley, Director of Engineering, Ford Motor Co.; Dr. Franklin H. Martin, Secretary, Chicago Commission on Medical Defense; Samuel Gompers, President of the American Federation of Labor. The only member of the Council missing from the picture is Secretary of the Interior Franklin K. Lane



MR. FRANKLIN D. ROOSEVELT

THE ASSISTANT SECRETARY OF THE NAVY, WHO RECENTLY CALLED FOR AN AUXILIARY FLEET OF 750 SHIPS AND SMALL CRAFT AND 10,000 CIVILIANS TO MAN THEM FOR THE PROPER DEFENSE OF THE NEW YORK NAVAL DISTRICT, ONE EXAMPLE OF THE WAYS IN WHICH CIVILIANS CAN AID IN NAVAL DEFENSE

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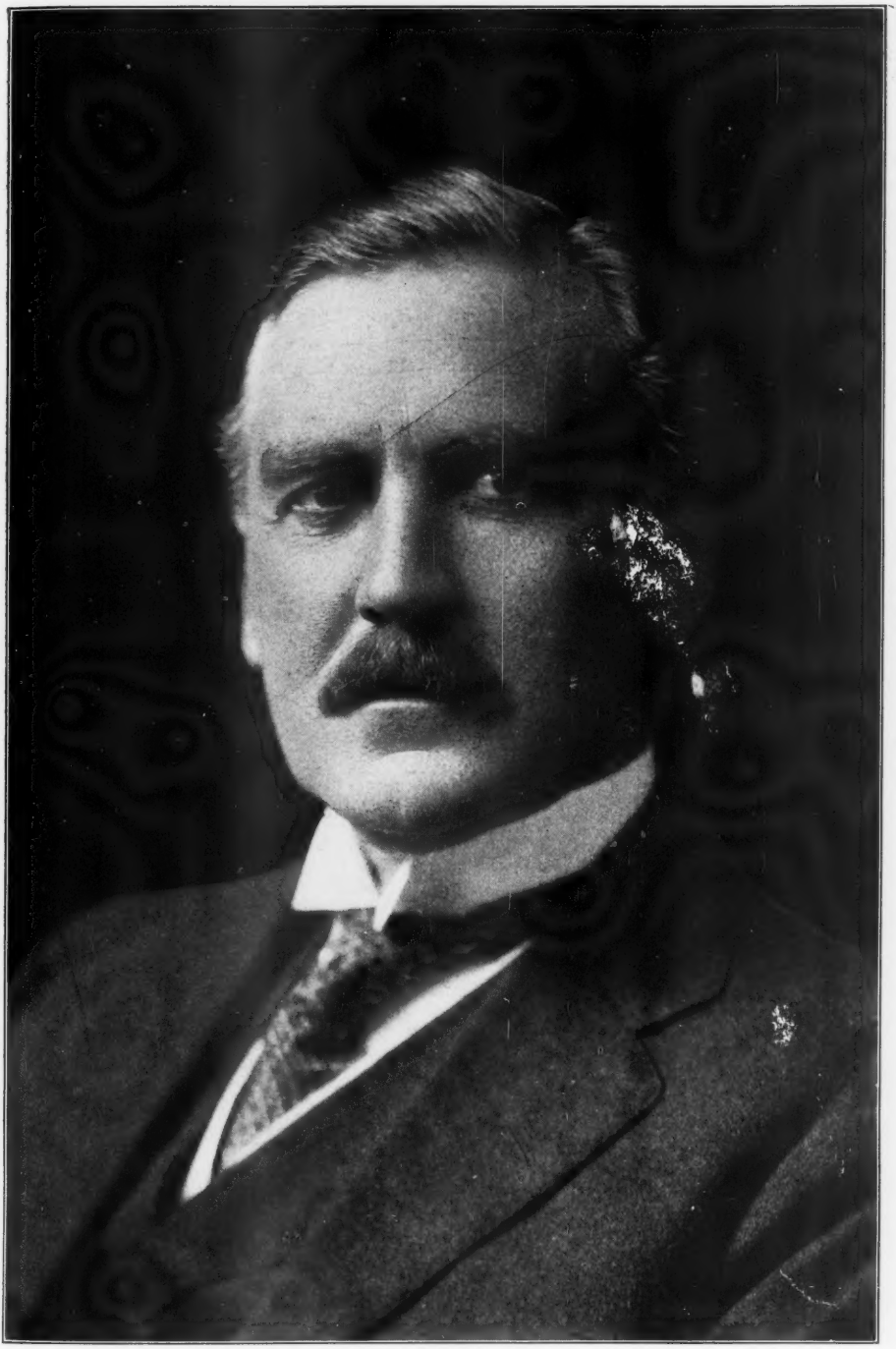

SIR THOMAS WHITE

CANADIAN MINISTER OF FINANCE, UNDER WHOSE ADMINISTRATION CANADA IS SPENDING $1,000,000 A DAY FOR WAR. BESIDES HER WAR LOANS, CANADA HAS PROVIDED ENGLAND WITH A CREDIT OF $250,000,000 TO FINANCE THE PURCHASE OF MUNITIONS. CANADA'S NATIONAL DEBT, WHICH WAS $335,000,000 WHEN THE WAR BEGAN, WILL PROBABLY REACH $800,000,000 BY THE END OF THIS YEAR

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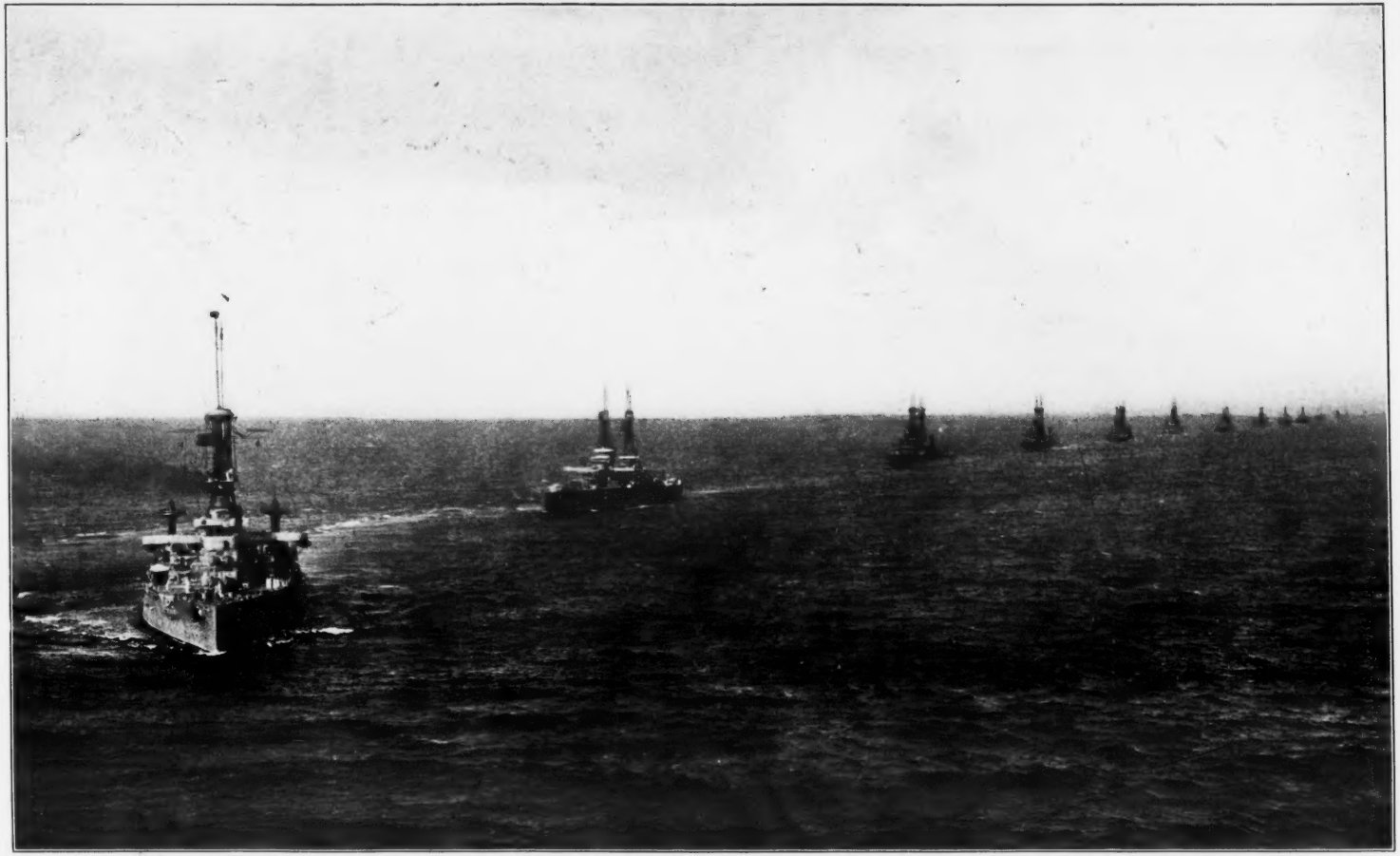
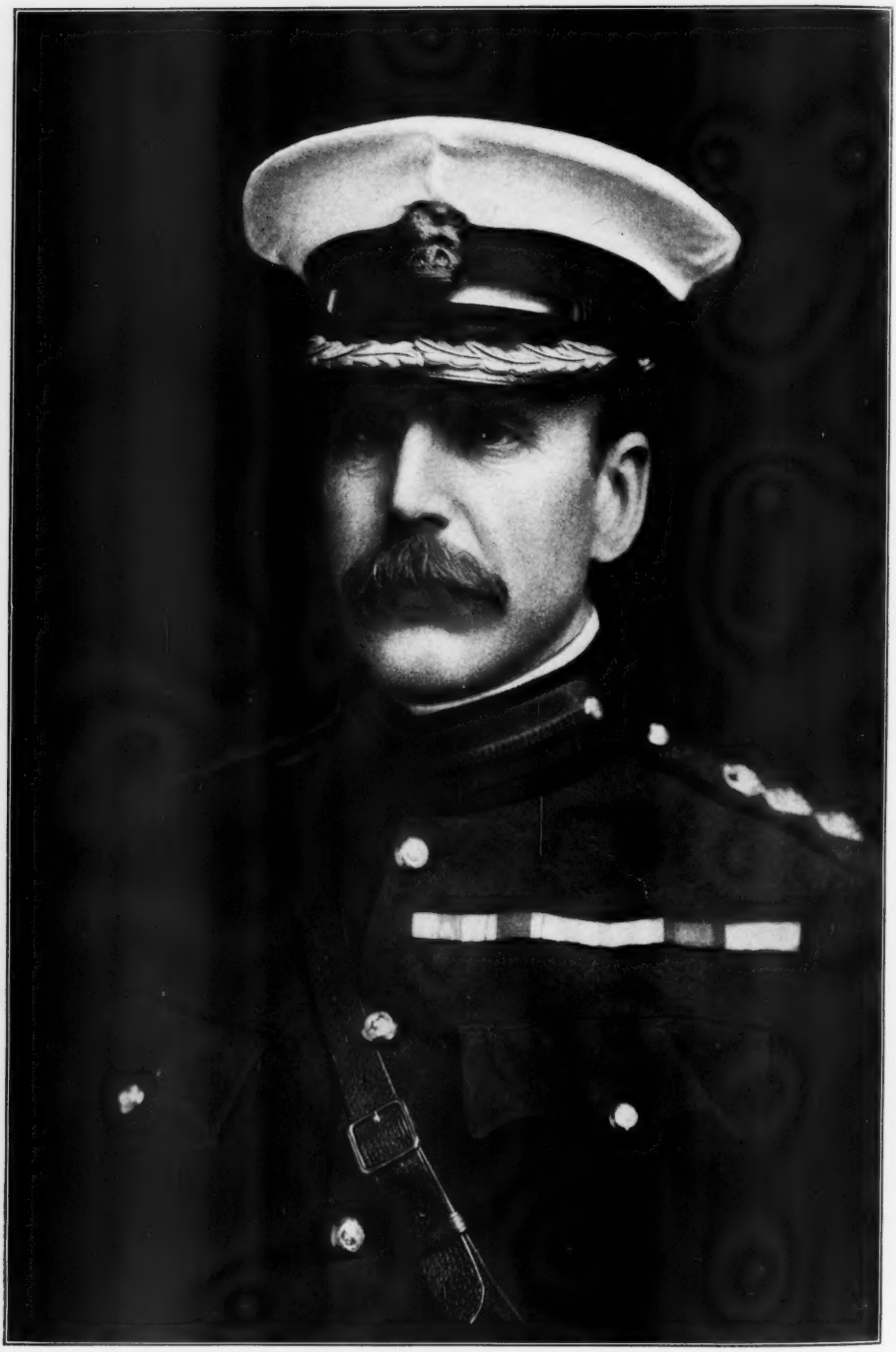


OUR FLEET NEAR ITS STRATEGIC BASE

THE ENTIRE ATLANTIC FLEET OF FIFTY SHIPS, HEADED BY THE FLAGSHIP "PENNSYLVANIA," ENTERING THE GULF OF GONAIVE, HAITI, DURING WINTER MANŒUVRES IN THE CARIBBEAN SEA AT THE TIME OF OUR DIPLOMATIC BREAK WITH GERMANY

"ON GUARD"

THE FLAGSHIP OF REAR-ADMIRAL KNAPP, MILITARY GOVERNOR OF THE ISLAND OF HAITI AND SANTO DOMINGO, ON GUARD TO PRESERVE ORDER THROUGHOUT THESE TURBULENT REPUBLICS



GENERAL FREDERICK STANLEY MAUDE

THE COMMANDER OF THE BRITISH FORCES OPERATING ON THE TIGRIS RIVER, WHO RECENTLY CAPTURED BAGDAD, THE MILITARY OBJECTIVE OF THE PROLONGED BRITISH CAMPAIGN IN MESOPOTAMIA

AMERICA IN THE BATTLE LINE OF DEMOCRACY

THAT the nation shall, under God, have a new birth of freedom, and that government of the people, by the people, for the people shall not perish from the earth."

These last words of the Gettysburg speech describe the great cause for which Lincoln sent armies into the field to fight. Yet these words do not describe the problem he faced then any better, if as well, than they picture the question which we face now. The Confederacy had no *kultur* designed to drive democracy off the earth. It wished to maintain slavery within its territories, but it had no dreams of a slave super-state. Nevertheless, despite its lesser menace, if the Confederacy had won the greatest experiment in democracy would have broken in two. The greater present menace is that, if Germany should win, every powerful democracy except our own would be immediately dominated by the most thoroughgoing enemy of popular government in the world, and in the final struggle for democracy we should be left nearly alone to conduct the fight against overwhelming odds.

At the end of this war either the world will have a new birth of freedom or a reincarnation of autocracy. Either there will be a spread of government of the people, by the people, for the people, or there will be a spread of a higher state under rulers answerable only to the god of their own imaginations. An Allied victory means strength for liberalism in Europe. And a German victory would everywhere give comfort to reaction.

The great majority of our population has believed that the struggle between these two opposing ideals does not concern us. This belief is a very natural one, for our public is particularly uninformed on foreign matters. For generations American citizens have discussed their every concern fully and freely except foreign affairs. The idea that our geographical isolation rendered us immune from foreign complications has confirmed us in the habit of leaving the determination of these matters in the hands of the President.

The American people do not blindly trust their Presidents in domestic matters. The public, after a fashion, keeps itself fairly well informed on internal questions, and while the Presidency gives its occupant a tremendous opportunity to guide and instruct public opinion it does not give the occupant the power to commit the country to a domestic policy without discussion but still with the assurance of public support. But the lack of public education on foreign affairs gives the President an almost dictatorial power in that field.

The outbreak of the struggle took the President, in common with practically all Americans and most Europeans, by surprise. It was only after neutrality was announced that there was time to begin to study into the causes and possible effects. The public in the United States immediately crystallized its opinion about the responsibility for starting the war and the merits of the two sides. With the exception of the German-born, a portion of the Jews, and a part of the Irish, America hoped then as now that Germany would be defeated. But this hope was founded mainly on the belief that Germany and her satellites were wrong in their quarrel with the rest of Europe. It was founded very little on the belief that the struggle concerned America or American institutions. In various quarters, however, as time went on it became plain that, whatever other characteristics the struggle had, one thing was certain—if Germany won, world democracy would receive a terrible blow; if Germany were defeated, democracy would receive a tremendous impetus. If the President with the power of his position had believed this and exerted his leadership in this direction, it would have become the national idea. As he did not believe this, but felt that the struggle was one in which a democracy could morally be neutral in thought and action, his leadership was used successfully to keep the majority of the people in this notion.

However, almost all Americans who saw the struggle at first hand or studied the German aims came back to report that fundamentally the struggle was in truth a struggle for democracy.

Out of this perception grew the phrases that the Allies or that England was fighting our battle—the battle of democracy. This phrase was naturally resented by Americans of spirit who did not have this idea of the struggle, because they did not want to be put in the inglorious position of having their fighting done by some one else. To prove that the war was none of our concern people pointed to the many weaknesses in England's record of democracy and to the undemocratic nature of the government of Russia and Japan. And there are many Americans who still believe that George III or his spirit still rules England, who distrust the result of any cordial relations for fear we should be dominated by a country of half our population and nothing like our wealth.

Suddenly, against this background was thrown the horrible picture of the sinking of the *Lusitania*. The President was again faced with the necessity of doing something, but this decision differed from its predecessor because there had been time in which to grasp the full significance of the struggle.

The President still held to his original decision—that the struggle did not concern democracy, or at any rate our democracy, and that the greatest service we could render civilization would be to stand as the guardian of neutral rights at sea. But there were a number who did not seriously wish to undertake the defense of our rights at sea, for they correctly realized that this held the possibilities of a conflict with Germany and an end of our neutrality. The President himself was willing to forego a good deal of the strictness of the accountability which he announced we should exact for violation of our rights in order to maintain neutrality. But, as he showed after the sinking of the *Sussex*, he was not willing to give up those rights. When he forced the vote on the McLemore and Gore resolutions in Congress he showed that there was a point beyond which he would not go. The vote also showed that there were a certain number of men in Congress who would give up to Germany entirely. During the long interchanges of notes between the two governments it developed that so long as we could maintain our position on paper and too many Americans were not killed at sea we felt it to be our highest duty to keep out of the war in order to maintain some part of the world where the processes of peace would continue. By sending Colonel House on special missions abroad and by frequent speeches the President led the public to believe that his policy held out the promise of a glorious part for America to play as a peacemaker, achieving great ends for civilization by mediation.

The President went into the election on the platform of peace, preparedness, and prosperity.

The peace plank was genuine and popular. "He kept us out of war" expressed the feeling of a large part of the population, and they looked very little beyond this phrase except to the surrounding prosperity and to the hope that we might somehow be a great force in the progress of civilization by continuing the processes of peace.

The preparedness plank of the platform was not very sincere. The Administration's record on preparedness is to do as little as public opinion will allow. During the last two years, what has been done for immediate preparedness has been to pass large appropriations for the Navy but to build no ships and to increase the paper strength of the Army and turn the National Guard into a pork-barrel scheme by the Hay Bill. For future preparedness the record is better, for the creation of the Council of National Defense with its Advisory Council lays a foundation on which a sound and economical preparation for defense can be made.

The prosperity plank was the time-honored custom of the party in power claiming and getting credit for good times if they exist.

Immediately after the election the President set to work to demonstrate that there was a nobler possibility in our rather over-worked patience with Germany than just keeping out of trouble. He may have been spurred on, too, by the many and almost unmistakable signs that Germany was not impressed with our reasoning and was going to resume its U-boat war-

fare in such a manner as to give us no choice but to give up our rights or fight. The President, therefore, put in practice his plan to end the war, or at least to affect its ending.

There is a curiously interesting comparison between the President's efforts to do something about the war in Europe and Napoleon III's efforts to mediate in our Civil War.

Napoleon's Ambassador in Washington, M. Mercier, was intrusted with carrying on these negotiations. He thought of the Civil War as many have of the present struggle. He believed the war would, if the Powers of Europe exercised no influence upon it, last for years. He thought the North could never win a decisive victory and he and the Emperor felt, therefore, that a mediation that would stop the war would be the best solution. But the effort came to nothing. As one of M. Mercier's colleagues described it:

"The Emperor of the French wishes to offer peace to both parties and he says both parties will agree to peace; the one on the ground of Union and the other on the ground of Separation."

Between the time the President was elected on the peace plank, with its hope of mediation, and his inauguration, the peace move was tried and failed and in its failure showed how far our Government had misconceived affairs abroad. The peace move was designed to increase our influence in Europe for the good of civilization. It did not affect our small influence in Germany much one way or the other. And the whole episode did not improve our influence with the Allies. The President's plan of what peace should be as interpreted by them pleased them, but his idea that it could be achieved without victory left them feeling that despite his experiences he had not learned to know Germany.

Then the Germans forced us to realize some of the actualities of the situation. The Chancellor announced that the ruthless submarine war would be resumed and that neither our ships nor our citizens would be spared. The President was faced with his promise to send Von Bernstorff home under these circumstances. He stuck to the promise, but even then still seemed to cling to the hope that in some way or other we might still maintain neutrality and keep out of war. Two of our ships were sunk. Other ships with Americans aboard were sunk without warning. Our Ambassador and our consuls were insulted and mistreated. Still we waited, even refusing to begin many obvious preparations because such preparations might indicate that we were giving up hope of maintaining peace with a nation which was already engaged in acts of war against us. The Government allowed the ships which we had subsidized for years for just such an emergency to give up carrying United States mail. And following a precedent set by Mr. Bryan at the time of the *Lusitania* notes, Mr. Daniels censored and forwarded a dispatch written by a German editor in this country intimating that the American Government would not be as vigorous in action as its words sounded. Finally, however, the practical blockade of our ports and the freight congestion caused by it forced the President to appear before Congress and ask for power to arm merchant ships. As if in commentary on the adequacy of this measure, the President was told on his way to the Capitol that two American women had been killed by the torpedoing of the British ship *Laconia* —an act which could be repeated as well after American ships were armed as before.

While Congress debated the President's proposals, the Associated Press, with the President's approval, printed the German Government's offer of aid to Mexico in the conduct of war against us, accompanied by the flattering suggestion to Mexican vanity that Mexico itself might become great in international affairs as a mediator between Japan and Germany. These German activities were the logical and natural outcome of our tolerant attitude toward Germany's previous conduct toward us at sea and within our own borders. Ambassador von Bernstorff knew that we would not agree to give up our rights at sea, but he knew from previous experience that his Government was comparatively safe in making preparations for a possible break, because even if we dis-

covered them we were so eager to keep our record for peace clear that we would not meet preparation with preparation. He could count on our fear that preparation breeds war to keep us from getting in a position to make our just resentment felt. Under these circumstances he was amazingly successful in painting a picture of a reformed Germany that longed for a righteous peace to keep up the illusions of our Government and practising all the arts of Prussianism upon us at the same time.

The first days of March after the break found us making belated preparations for armed neutrality while Congress debated the wisdom of entering into this state. Considering what preceded the events between the first of February and the first of March, this state of affairs was almost inevitable; for, having proceeded for nearly three years on a wrong conception of conditions abroad, we naturally had made few arrangements for any sudden facing of real ones. The press consoled itself to some extent by discovering for condemnation the German qualities which have been abundantly obvious since August, 1914, and wondering at the barbarity of Germany's conduct.

There was some comfort, too, in the fact that John Adams invoked the device of armed neutrality and that Lincoln was patient in the face of the secession movement. These historical analogies are not very good guides to conduct unless the conditions are carefully studied. But these particular analogies, on second reading, are not even very superficially comforting. John Adams did enter into a state of armed neutrality, but his practice of it was as warlike as if he had declared war. The *Constellation* sailed across the Atlantic, attacked and sunk two frigates of the nation *against* which we were neutral, and we *raised* an army and put George Washington at its head. In the other case Lincoln did go slowly between inauguration and the attack on Sumter. And the reason was much the same as now. He had been preceded by four years of Buchanan's policy of conciliatory non-preparation and hopeful waiting. On the 4th of March, 1861, the country was ill prepared both physically and mentally to meet its responsibilities, and the same was true fifty-six years later, on the 4th of March, 1917.

Still, whatever the historical analogies, the fact is that when the emergency came we were unprepared, fearful lest by meeting war with war we should lose the virtues of neutrality and the services to civilization of our maintenance of the processes of peace. We were loth to admit that our peace policy had had no other virtue than to keep us out of trouble, and a little ashamed, after so long denying that our entry into the war would serve democracy, to take up that cause only when Germany made our peace plans untenable. Nor was it pleasant to realize that the blockade for our commerce was the immediate reason for discussing action which the death of our citizens failed to produce.

Altogether, thoughtful Americans felt bewildered and uncomfortable, and most of them sought comfort in urging immediate action. The President, too, seemed convinced that action was necessary. But he was not instantly prepared to urge it. It was twenty-three days from the time that Bernstorff was given his passports until the President appeared before Congress to ask for a confirmation of his power to arm American ships. A week was left before the term of the Sixty-fourth Congress expired. The House granted the President the powers he asked by the overwhelming vote of 403 to 13. But taking advantage of the ancient rules of the Senate, eleven members of that body prevented the passage of the bill.

This little group of workers for national cowardice had their way for the time being but, of course, beyond making a legislative record of national humiliation they accomplished nothing permanent. They bound the American people to nothing. The great majority of Congress showed that it would go as far as the President would lead.

After the Senate's disgraceful proceeding the public, under the President's leadership, was faced with exactly the same fundamental questions as before.

Should we meet the German attack on

our rights? Should we claim a part of the duty of insuring a democratic victory in the war?

The plan of armed neutrality was equivalent to telling the Germans that the only danger they ran of war on our commerce would be that some of the merchantmen might sink the submarines that attacked them, but that we should do nothing else to convince Germany of the unwisdom of hostility against us.

Our other alternative was to make war on Germany in the only way in which it could be done effectively—by putting the power of our finance, industry, and transportation behind the sharp sword of the Allies and to begin to train an army as an evidence to Germany that no matter how long the war lasted there would be plenty of men against her. This would mean that we should put ourselves whole-heartedly into the battle line of democracy, and do our part to rid the world of democracy's greatest enemy.

This was a clear enough duty, but one which as a Government and as a people we had studiously schooled ourselves not to face. It involved, first of all, the admission to ourselves that civilization had got no great impetus from our hesitant defense of our rights, and, secondly, the realization that our refusal to prepare so that we would be an immediately serious enemy had been one of the most potent causes of crises we had tried to avoid.

While still wondering if we should have to fight, a few voices grasped the opportunity to point out that if we should actively enter the fight for democracy, we could actually accomplish the high ends toward which our unfruitful efforts at peace were directed. As believers in democracy who will put the test of service to our beliefs, we can not only help rid civilization of its great and organized menace but we can have a real and justified influence toward any or all the ends outlined in the President's programme of what peace should be like at the end of this war. Our participation in the relief of Peking helped for a while to save China from dismemberment. Our participation in this war can make our influence for democracy felt, not as much as if we had faced the issue sooner, but a thousand times more than if we never face it at all.

But although the attitude of the Government has in the past consistently been that we should not face this issue while facing it would bring us into the war, it had encouraged public opinion to consider the possible international obligations of the United States at some later time.

We no more want territorial or money indemnity than when we went to war with Spain to give the Cubans a free government. And a war against Germany would not leave us in possession of new territory. We should want nothing for ourselves except perhaps the official recognition of the practically long recognized Monroe Doctrine.

Our other aims would be a settlement of the war most likely in human judgment to promote peace and democracy. In this, of course, we should now have to accept in general the terms outlined by the Allies at the President's suggestion, terms which in large measure received public support in the United States. We might perhaps be able to make many details of peace take on a more democratic tinge than they otherwise would have.

These are the broad and altruistic grounds of our usefulness. And we can also serve ourselves in a legitimate manner without interfering with the rights of any other people.

We can, in the first place, get a sympathetic debtor's committee for our referee work on foreign claims in Mexico. We can bring up as an international matter involving all the nations the status of the Open Door in China. We can, perhaps along with the British dominions of Canada and Australia, work out a satisfactory solution of the vexed question of Japanese immigration. We can more easily than otherwise renew treaty relations with Russia and with all Europe. We can enter into a discussion of trade relations, especially tariffs and trade with dependent peoples, that might raise the level and decrease the friction of existing practices. Our morals in these matters can gain at least as much as they can give by foreign contact.

None of these ends contemplates either more or less of entangling alliances than we had when, single-handed, we chastised the Barbary pirates or in coöperation with other nations raised the siege of Peking, and not as much as when we endorsed the sacredness of neutral territory at The Hague or announced our championship of neutral rights at sea. The precedent established (though with no promise to follow it) would be only that if ever again any country should start on a campaign of world conquest and necessarily, thereby, of the destruction of free government, the United States would be among its active enemies.

The President in his inaugural address said:

> These are the things we shall stand for, whether in war or in peace:
>
> That all nations are equally interested in the peace of the world and in the political stability of free peoples and equally reponsible for their maintenance.
>
> That the essential principle of peace is the actual equality of nations in all matters of right or privilege.
>
> That peace cannot securely or justly rest upon an armed balance of power.
>
> That Governments derive all their just powers from the consent of the governed and that no other powers should be supported by the common thought, purpose, or power of the family of nations.
>
> That the seas should be equally free and safe for the use of all peoples, under rules set up by common agreement and consent, and that, so far as practicable, they should be accessible to all upon equal terms.
>
> That national armaments should be limited to the necessities of national order and domestic safety.

If we really believe "that all nations are equally interested . . . in the political stability of free peoples and equally responsible for their maintenance" we cannot meet this responsibility by words alone.

The main question is still whether the nations of the earth shall have a new birth of freedom and whether we shall have the leadership and courage to do our part in defending the principles of democracy and the rights of nations to live their own lives in security against aggression. The initiative is in the hands of the President, the referendum is the voice of the people.

HIGH PRICES AND TRANSPORTATION

THE susceptibility of our whole economic life to transportation and the present dependence of all parts of the country on sea transportation are strikingly shown by a chronicle of what happened for the first fifteen days after Germany's submarine announcement. That announcement caused what amounted to a partial blockade of our ports, with the stoppage of a large share of our imports and exports, and serious effects upon prices to producers and to consumers.

During the first fifteen days of February only 154 vessels, of 440,525 net tons, cleared from the Port of New York for foreign ports. There had been 185 vessels of 526,755 tons in the same period of January, and 177 vessels of 526,240 tons in the first fifteen days of December. That meant a falling off of nearly 20 per cent. in foreign shipping traceable to German submarine operations. This percentage applied to other Atlantic ports.

The falling off in shipping was accompanied by a decline in export freight delivered by the railroads at New York, Boston, Philadelphia, and Baltimore. In the first two weeks of February it amounted to 8,146,000 bushels of grain and 12,632 carloads of other freight, while in the month of January it was 29,854,000 bushels of grain and 33,100 cars of other freight, and in December 19,837,000 bushels and 31,600 cars of freight. The railroads, in their efforts to handle individually the growing transportation problem of the last two years, had adopted the plan of refusing to accept export freight unless shipping arrangements were already made. When Germany's threat upset the shipping, the railroads' difficulties were immediately augmented, for loaded cars began to pile up all along their lines.

This situation was explained by a spokesman for the American Railway Association on February 16th as follows: "When the submarine blockade went into effect export shipments that were on their way to New York were stopped at the nearest convenient point, and have been held there since. The only shipments

that came into New York after the blockade went into effect were those which were already so near the city that it would have been useless to hold them up elsewhere. This system has, of course, increased the congestion in yards at points west, but it has had comparatively little effect on the New York situation."

The effect of the U-boat threat in the eastern part of the country spread westward. Embargoes were placed on both west-bound and east-bound freight. Approximately 4,000,000 bushels of wheat already sold for export could not be moved from Minneapolis, and it was reported that 30,000,000 bushels of grain were held in Chicago elevators and that about 7,000,000 bushels were tied up in cars in the Chicago district. The difficulty was to get cars to supply the wants of the various sections of this country. That this serious situation had been developing prior to February 1st was shown by an increase in the net shortage of freight cars throughout the country from 62,247 on January 1st to 109,770 on February 1st, but the German threat intensified the situation and was felt even 2,000 miles inshore. There was need for more cars in early February in every part of the country except the East. The continued unfavorable weather, the interference with shipping, and the tying-up of loaded cars greatly increased this shortage after February 1st, and the railroads soon faced a shortage of equipment very similar to that of February, 1907.

Many cities and towns were threatened with a flour and coal famine, and from the Middle West came reports of further food shortage. One would naturally expect that restriction of exports would operate to increase supplies and reduce prices in this country. Transportation, however, sometimes plays a seemingly illogical part in the working of the law of supply and demand, and it was chiefly the transportation difficulty, intensified by the decrease in sailings for the war zone, that sent nearly all prices to new high war levels.

More than one fourth of the 50 per cent. increase in food prices that had occurred in a year took place in the first twenty days of February. A statement of the Interstate Commerce Commission, following this sharp advance, that "no actual food or fuel shortage exists anywhere in the country, and the high prices should not be attributed to the present freight congestion," contained little consolation for the housewife who was trying to feed a hungry family on the same allowance she had the month previous; but when the Commission went on to say that "transportation conditions will improve steadily," there was reason for her to hope that the high prices would be temporary.

After two years of attempting independently to solve their traffic difficulties the railroads came together in a joint action. Of course, it is probable that the congestion might not have been as bad had the railroads in recent years been able to spend more for equipment. The right method for meeting the trouble at this time, however, would have been the same in any case.

What happened was this: representatives of thirty principal roads got together in Washington and reached a "gentlemen's agreement," covering, among other things, a virtual embargo on all export shipments to eastern ports, the liberal use of the embargo against other freight, and definite plans for the return of empty cars to the West. To meet the urgent requirements for grain in New England, and flour at Pittsburg, Philadelphia, New York, and New England, plans were adopted for bringing two trains a day from Minneapolis alternately over different roads. In simple terms, the railroads, by getting together, agreed that they had to act as a unit to cope with the situation.

If this experience of February in the transportation field means anything, it clearly indicates that the only way to deal with such a national problem is through a central control in which ample power is vested. And if rising living expenses since the war started have not shown the need of such control of our transportation lines before this time, then the sharper advance in February, and the urgent need of such control as a measure of preparedness, should be sufficient to show the need.

AFTER-WAR BUSINESS

EVERY American business man wants to know what effect the ending of the European War is going to have on business in this country.

He knows that the increase in our exports of explosives, for instance, from $6,000,000 in the 1914 fiscal year to $467,000,000 in 1916, cannot last, but he is in doubt as to how much of the advance from $165,000,000 to $436,000,000 in exports of breadstuffs, or from $251,000,000 to $621,000,000 in exports of iron and steel products, we are going to hold.

A recent report of the National Foreign Trade Council on "World Trade Conditions After the European War" throws some light on this situation. It estimates the loss of public and private property in the European theatres of war at nearly $6,000,000,000. Some of this loss will never be replaced, and a good part of it will only be restored gradually.

Agricultural machinery, seeds, and building materials will be in immediate demand in Europe after the war. The Federal Trade Council estimates the first year's needs of Belgium and France for industrial buildings, for machinery of all kinds, and for railroad repairs, bridges, roads, and other Government property at $1,316,000,000.

Germany will require little of these for reconstruction, but her need for food supplies and raw materials will be urgent. This is estimated for the first year at about double what it was before Great Britain shut her off from our markets. This discloses a possible demand by Germany for $1,890,000,000 of goods from this country in the first year after the war, and for about $400,000,000 more by Austria-Hungary. Adding the Russian estimate of $600,000,000 for that country's requirements for rebuilding, a total possible demand for $4,200,000,000 of food and materials is disclosed.

The United States, right after the war, will be in as good, if not better, position than any other country to supply these demands; and having gained a fair share of the business, we should be able to keep at least a goodly proportion of our export trade, which amounted to $5,481,000,000 in the last calendar year.

The details of export and expectations of export of one kind of product may make the situation plainer.

The locomotive builders of America received, in 1916, for the first time in history, orders for more locomotives from foreign countries than from American railroads. Of the sales of railroad cars and locomotives in 1916 (totaling more than $550,000,000) nearly one third were for export, principally to England, France, and Russia. The largest buyer of such material in the last two years has been the Russian Government, which has ordered in America, since June, 1915, 1,134 steam and gasolene locomotives and nearly 21,000 freight cars. No American railroad during the last two years has ordered as many locomotives, and only one American system, the New York Central, has ordered a larger number of cars. The largest order for rails ever placed in this country was placed by Russia last July—for 425,000 tons of 67½-pound rail at $50 a ton. For years before the war the standard price had been $22 a ton. Russia also ordered more than 300,000 tons in 1915. Since the war began the War Office and railroad lines of France have ordered in America 791 engines and 35,000 cars. England, since February, 1916, has ordered 830 engines, most of them for use in France. American locomotive builders have received orders from Belgium, Serbia, Egypt, and Finland. Italy has come to us for 100 large engines and 3,000 freight cars. We have sold 88 large engines to private lines in Spain.

The freight cars have been practically all for regular service. The locomotives have ranged from tiny seven-ton gasolene locomotives and queer little steam or fireless locomotives for use behind the trenches to large 100-ton engines for use with heavy trains. One of Russia's larger engines (there have been 650 of them), although small as American standards go, holds the record for having hauled the heaviest train in Europe.

These orders are fast putting one of America's largest industries on a peace

basis, and there is every reason to believe that the orders will continue to come to us in the future. It is a difficult task to estimate the actual depreciation of railroad equipment in the warring countries. We do know, however, that cars and locomotives are being called upon for unprecedented service, and we have had our attention called again and again to the shortage of labor and materials that has prevented proper maintenance of railroad rolling-stock. When the war is over European railroad shops will be hard pushed to bring back to standard such equipment as they will have and to replace such of it as will be beyond repair. They will, therefore, have little chance for many years to manufacture sufficient new equipment to meet increased demands. Even if the British increase their locomotive building, it is fair to assume that if America makes good on its present car and locomotive contracts there will be a demand for American locomotives overseas.

And America is making good on her present contracts. The equipment for France and England is being built to the standards of those countries except for certain details concerning which the buyers have been convinced that American practice is slightly better. The big strides that American car and locomotive builders have been making within the last few years are helping greatly toward meeting those refinements in design that hitherto have characterized much foreign railroad equipment in distinction to our own.

AN INCH OF DRESS COSTS $10,000,000 IN SHOES

AT A convention of retail shoe dealers recently, a member of that trade, Mr. A. D. Anderson, of Boston, made the following remarks which to the ordinary consumer can hardly help being somewhat startling:

"Every inch added to the length of women's dresses means a loss of $10,000,000 a year to the shoe business. When we have short skirts we can make lovely high boots that are pleasing to women, and give her an added touch of beauty. Such shoes are costly, but this is a prosperous country, and women who can afford expensive gowns will not hesitate to pay $20 for boots, provided they get style and quality. This is true of the shopgirl, too, in like ratio. This year the skirts are to be 6, 7, and 8 inches from the ground, which means that shoes or boots are to be high."

Mr. Anderson advised the shoe men to employ style experts who could advise their customers as to the proper styles and color effects in shoes. The color of the shoes, he said, should invariably match that of the gown.

Mr. Anderson conducted a style show that brought to the fore a new element, not hitherto discussed, that the shoe manufacturers and the garment industries are in conflict. According to Mr. Anderson the skirtmakers want them long, while the shoemakers are demanding from eight to nine inches of a woman's pedal extremities for themselves to show off their high shoes. The hosiery makers demand two inches for the display of their goods. From there upward the garment makers are given full sway.

"This," said Mr. Anderson, "is not altogether pleasing to the garment manufacturers, who argue they must lengthen the skirts to allow them to sell more material, and for every inch added to skirts $10,000,000 goes out of the pockets of the shoe men."

Mr. Anderson draws a neat picture of the squabble between the dress makers, the makers of stockings, and the shoe men over which shall get some ten million dollars of the American woman's money. If the shoe people win women wear short skirts. If the shoe and stocking groups combine they are likely to wear very short skirts. If the skirtmakers dominate the situation shoes and stockings will be less conspicuous.

The only people who seem to have no voice in the matter are the women who are to pay the ten million dollars and wear the clothes. Might it not be a good plan if some or all of the women's societies took up the question and decided on what they thought would be most becoming and comfortable for the ten million dollars they seem destined to pay?

HAVE WE BECOME LEVITES?

BELGIUM and the occupied portions of Northern France are the only parts of Germany's conquests where there is an organization that can get food to the people.

The organization that established a new precedent in history by volunteering to distribute food in conquered territory and accomplished an extraordinary diplomatic feat in getting and maintaining the confidences of the belligerents on both sides is American. This American organization has fed the Belgians better than Germany has fed the Germans and has bought food with English money, carried it to Belgium, and sold it to the Belgians and French cheaper than the price at which the same food could be had in London. The entire overhead charges of the Commission for the Relief of Belgium are less than one per cent. Most of the money for this work is advanced by the Governments of England and France. That has been supplemented and must be supplemented by private donations. The donations have come from many countries, but those that have been most generous are those on whom the other burdens of war are heaviest. The United States, in proportion to its numbers, has given least. Generous Americans should send money to the Commission at 120 Broadway, New York City.

There are many things about this situation which remind one of the story of the good Samaritan, which is:

A certain man went down from Jerusalem to Jericho, and fell among thieves, which stripped him of his raiment, and wounded him, and departed, leaving him half dead.

And by chance there came down a certain priest that way: and when he saw him, he passed by on the other side.

And likewise a Levite, when he was at the place, came and looked on him, and passed by on the other side.

But a certain Samaritan, as he journeyed, came where he was: and when he saw him, he had compassion on him.

And went to him, and bound up his wounds, pouring in oil and wine, and set him on his own beast, and brought him to an inn, and took care of him.

And on the morrow when he departed, he took out two pence, and gave them to the host, and said unto him, "Take care of him; and whatsoever thou spendest more, when I come again, I will repay thee."

Which now of these three, thinkest thou, was neighbour unto him that fell among the thieves?

And he said, "He that shewed mercy on him."

THE COST OF THE WAR

THE war to date has cost the fighting nations close to 80 billions [$80,000,000,000] of dollars, and every day now adds about 115 million dollars to that total. Most of this gigantic cost has been paid by government borrowings. Aside from the amount that Great Britain is meeting direct from taxes, both the Allied nations and the Central Powers have already mortgaged, by loans or otherwise, about one fifth of their combined national wealths to meet the cost of war. If the wealth of the United States were added to that of the Allies, it would nearly double their total wealth. This indicates how the credit of this country might be used to help them.

The Allies, in vigorously continuing the war, have spent nearly twice as much as have the Central Powers, one of the chief reasons for this being that the Central Powers prepared in peace times, when preparation is cheap, and the Allies improvised in war time, when improvising is wasteful and expensive. The total cost to the United Kingdom, according to Mr. Bonar Law's latest statement in Parliament, was 21 billion dollars, and the present daily cost $28,950,000. These figures include England's generous advances to her allies, and show that she is carrying more than one fourth the total war cost. The division of the total daily net cost is now around $75,000,000 for the Entente Allies and $40,000,000 for the Central Powers.

This is at the approximate rate of 19 cents a day per capita for the Allied countries of Europe and Asia, exclusive of their colonies, and at the rate of 26 cents for the Central Powers. With Canada, Australasia, India, and all other colonies included, the daily per capita cost to the Allies is less than 9 cents, while for the Central Powers, including Germany's colonies, it is more than 24 cents.

Corresponding figures for the total cost of the war to date are approximately $142 per capita for the Allies without their colonies, and $173 for the Central Powers. Including colonies in both cases, the cost of two and two thirds years of modern war-

fare has been about $63 per capita for the Allies and $158 for the Teutonic Powers. Although the Allies are spending twice as much money, the burden on them is not half as great.

As an indication of the comparative financial strength of the fighting groups the record subscription of new money for the latest British loan, from five times as many subscribers as for any previous loan, shows an increasing strength beside the reduced amount of subscription for the fifth German war loan and the significant reduction by more than 25 per cent. in the number of individual subscribers.

THE EPISCOPAL CHURCH PENSION FUND

A GENERAL pension system went into operation in the Protestant Episcopal Church in the United States on March 1st. It provides for the old age or disability of the 4,500 Episcopal ministers in the United States and for their widows and dependent orphans. These ministers receive an average salary of only $1,200 a year, which includes the value of a house, when provided. Obviously this amount gave little chance for saving and when the average minister got too old to work he must face extreme poverty. This has now been mitigated by a deferred salary of at least $600 a year after his active ministry is over. The raising of the fund necessary to start this pension system on a scientific basis should mark an epoch in the history of the Episcopal Church. Fifty dollars a month is not a great deal with which to make comfortable one's declining years but it is enough to make a man independent and to save his self respect. And this assurance for old age should make the call to the service of the church more appealing, so that abler men will become ministers, and as the pension is paid after retirement there will not be the same incentive for men beyond their age of usefulness to cling to their tasks to avoid starvation or charity.

The interesting characteristic of this pension system is its sound business basis. The money to pay pensions now coming due is already provided for at the start. Funds are now in hand to begin payments at once to those who reach the age of retirement after March 1st, or to the widows and orphans of ministers who die after that date. More than $6,500,000 in cash or pledges has been contributed for that purpose. The pledges were conditional on the raising of $5,000,000 which actuaries scientifically computed was the minimum amount necessary to put the plan into full immediate operation. To continue its full effectiveness each parish must now pay to the fund an amount equivalent to 7½ per cent. of its minister's salary. Separate accounts will be kept for each minister and the others will not suffer a reduction of their pensions if any parish neglects to pay its assessment. This pension fund has voluntarily placed itself under the provisions of the New York State insurance law, which is proof that it will be able to fulfill all its promises. It is the first instance of a pension system being subject to insurance supervision, and one of the first cases where such a fund has raised its accrued liabilities at the start.

To Bishop Lawrence of Massachusetts largely is due the credit for the method and success of raising in a year the large sum needed to start this system. The campaign, however, was supported and carried on by the laymen of the church and it is they who will see that the plan receives the support that has been pledged by each of the sixty-eight dioceses and that it continues to operate fully.

"THRIFT BONDS"

NO SMALL part of the wonderful showing France has made in this war has been due to the fact that back of the army in the field has been a much larger army of trained investors supplying the "silver bullets." For when the French peasant gets 100 francs ahead he becomes an investor, and his first purchase is generally a Government bond, or a "rente" as it is called in France. This means that he buys an interest return, and he thus becomes an investor in the truest sense of the word. He will likely hold the

security till death. It has been the holders of these 3 per cent. rentes (said to number more than 4,500,000 when the war started) who have appreciated the attractiveness of a 5 per cent. French Government obligation and have backed their patriotism with their investment training. In no other nation is so large a percentage of the people holders of government bonds and thus directly financially interested in the outcome of the war.

The movement to spread the "Thrift" idea in this country, started by bankers a year or more ago, has met with slow response, as was expected, but there is evidence that it has made progress. It should be continued vigorously as a measure of preparedness for peace as well as war, and should have the hearty support of every American.

One of the most important developments in this thrift campaign has been the recent organization of the National Thrift Bond Corporation by reputable banking and business interests for the sale of small-denomination certificates backed by municipal, county, state and national bonds. These "Thrift Bonds," in denominations as low as $10, will be put on sale in department stores, cigar stores, drug stores, etc., as well as in banks and express offices. The tax-secured bonds on which they are based will be deposited with the Equitable Trust Company of New York, and, as further security, a safety reserve fund will be established. The corporation will be under the supervision of the New York State Banking Department. "Safety and 3 per cent.!" will be its motto. That there is reason to believe people with small savings will invest at 3 per cent. interest is the conclusion that must be drawn from the fact that more than $100,000,000 has already been deposited under the Government postal savings system, where it earns only 2 per cent. The progress of this plan to popularize safe bonds will be watched with interest.

A WORD OF APPRECIATION

WHEN the special edition of the WORLD'S WORK was put to press last month (March issue) the editors of *The Scientific American* generously granted this magazine the privilege of reproducing from its pages several diagrams of submarines. In the haste of making up this emergency number, credit lines acknowledging this courtesy were omitted through inadvertence. The editors of the WORLD'S WORK take this opportunity to make amends and to express their appreciation.

GOOD SMALL BONDS FOR SMALL INVESTORS

Every month the WORLD'S WORK *publishes in this part of the magazine an article on experiences with investments and lessons to be drawn therefrom.*

RECENTLY, the editor of this department made an analysis of his correspondence to discover, if possible, whether it contained any evidence of the results of the campaign of education in thrift which the bankers carried on with so much vigor last year throughout the entire country.

The analysis disclosed a surprisingly large number of letters, received during the last few months in particular, from people who appeared to possess the four qualities which the head of one of the large savings institutions in New York once declared a man must possess in combination before he could be thrifty: namely, industry, economy, prudence, and frugality. It revealed, also, the fact that the authors of these letters were of two general classes; first, those who felt the necessity of entering into some kind of ironclad contract, involving the obligation

to devote so much money at certain periods to a definite purpose; and second, those to whom the idea of contractual obligation was more or less distasteful.

A letter from one of the latter class touched in an interesting way upon a phase of the investment market to which it seems timely to refer in detail because of its rapidly increasing importance.

"Your pages," this correspondent said, "have been carefully read to see if any advice has been given recently to the particular class of society to which I think I belong at present, but thus far I have failed to find any. In order to receive a definite answer, I realize you must have explicit data, so here it is:

"I am a civil engineer, thirty years of age, with one child and a sensible wife. I am employed in the Government service at a salary of $125 per month and my subsistence.

"My wife has a private income of $50 per month, and we live by the budget system, allowing $100 per month for all expenses. I carry $3,000 life insurance in the form of a twenty-year, paid-up policy.

"Twenty-five dollars a month is set aside for the education of our daughter when she grows up. We have, therefore, $50 a month to invest. . . .

"We are not so much interested in easy or rapid liquidation possibilities as we are in high income yield and safety. Nor do we care to buy anything on the partial payment plan, as the entailed obligation, we fear, might be the cause of a good deal of worry. . . . What we buy we wish to be entirely paid for at the time.

"Apparently, stocks, or bonds in $100 denomination, would meet our requirements, but there are so many issues that a neophyte is at a loss to know what to choose."

In replying to this letter, two general suggestions, pertinent in all cases involving the disposition of small savings, were made. First, that as between stocks and small denomination bonds, the latter could be recommended the more strongly in the early stages of one's investment experience. And second, that even if there were many of these small bonds having the same underlying security as the big bonds in which the savings banks invest the funds of their depositors, their purchase could not be urged haphazardly upon every thrifty person with savings of only a hundred dollars or so.

It is well to repeat in this connection what this magazine has frequently said in referring to the small-denomination bond "movement," as it is called; namely, that these big, resourceful institutions—the savings banks—have means that are not at the disposal of small investors to minimize the effects of the mistakes of judgment to which investment, however carefully managed, is always subject.

But granting that the savings banks deposit is a form of investment for which, for a great many people, there is no proper substitute, there are circumstances, nevertheless, in which the little saver may safely and advantageously supplement his bank account by judicious purchases of bonds.

It is gratifying to find nowadays fewer corporation managers and municipal authorities who are averse to splitting up parts of their bond issues into the smaller units; and fewer bankers who, merely because of the admittedly increased cost of distribution, will refrain from encouraging among their clients a demand for such investments.

In the quiet, unlisted class of bonds, the

BONDS	YEAR OF MATURITY	YIELD OF INCOME
American Foreign Securities 5% notes	1919	6.75
Anglo-French 5's	1920	7.50
City of Bordeaux (France) 6's	1919	8.50
City of Lyons (France) 6's	1919	8.50
City of Marseilles (France) 6's	1919	8.50
City of Paris (France) 6's	1919	9.00
City of New Orleans, La., 4½'s	1947	4.09
City of San Francisco 5's	1950	4.15
C. B. & Q. Denver div. 1st 4's	1922	4.00
Chic. Mil. & St. Paul conv. 4½'s	1932	4.65
Norfolk & Western 1st cons. 4's	1996	4.25
S. Pacific-San Francisco Terminal 1st 4's	1950	4.75
Virginian Railway 1st 5's	1962	5.00
American Gas & Electric deb. 6's	2014	5.98
American Power & Light deb. 6's	2016	6.10
Denver Gas & Electric 1st 5's	1949	5.00
Kansas City Railway 1st 5's	1944	5.09
Kansas City Light & Power 1st 5's	1944	5.10
Montana Power 1st. and ref. 5's	1943	5.00
Bethlehem Steel 1st. & ref. 5's	1942	5.00
Central Leather 1st 5's (registered)	1925	4.75
General Electric debenture 3½'s	1942	4.75

SMALL-DENOMINATION BONDS
And their rates of income

supply of small-denomination issues has increased rapidly during the last year or so, and it is to this class that investors who, like the young engineer, are "not so much interested in easy or rapid liquidation possibilities as in high income yield and safety," may well turn their attention at first. Here will be found numerous municipal and public service corporation bonds yielding from 4½ to 5½ per cent. The way in which such bonds are handled makes it impracticable to cite specific issues, but the small investor needs no better guide to safety than to confine himself to such bonds as are recommended for his particular purpose by banking houses of long experience and success in these fields of specialized finance.

To illustrate the variety of small-denomination bonds of both the listed and unlisted classes that are better known in the general market and more or less actively bought and sold from day to day, the list on page 593 is given.

For an investor in circumstances like those described in the young engineer's letter, one might recommend successive purchases for the first $500 of such bonds as the Anglo-French 5's, City of San Francisco 5's, Chicago, Milwaukee & St. Paul 4½'s, Montana Power 5's, and General Electric 3½'s.

WHAT WE CAN LEARN FROM CANADA

ITS SUCCESSES AND FAILURES AS A WAR-MAKING DEMOCRACY AND THEIR LESSON FOR US

BY

BURTON J. HENDRICK

WHAT can the United States, in its present crisis, learn from Canada? In many ways the recent history of our northern neighbor presents a contrast that is not entirely gratifying to our national complacency. The decision with which Canada acted in the early, fateful days of August, 1914, contains certain lessons for the Wilson Administration. The world war came to Canada as an overwhelming surprise. It found the Dominion even less prepared for war than is the United States. Canada had practically no naval forces to defend her coasts against German assault—a danger which, with German cruisers roaming the Pacific, was an imminent one; she had a "standing army" of less than 3,000 men, scattered all over her extensive territory, and an ill-equipped and untrained militia of perhaps 60,000. Canada's economic condition was deplorable; the Federal Government itself had over-extended its credit for the construction of internal improvements, many of them unwarranted; business conditions were depressing and unemployment was widespread. Party feeling ran high. Yet, as soon as the German army crossed the Belgian frontier, Canada instantaneously placed herself on the side of civilization. The Prime Minister, Sir Robert Borden, notified the mother country, on his own responsibility, that Canada regarded the war as Canada's war and would assist England to the limit of her men and resources. An extra session of Parliament, called immediately, overwhelmingly ratified this decision. Sir Wilfrid Laurier, the leader of the opposition, and Canada's most brilliant statesman, declared a "truce to party politics," and eloquently placed the Liberal Party back of the nation. Parliament voted a preliminary credit of $50,000,000 for war purposes, and, in six weeks, a force of 33,000 men sailed for England.

The experience of Canada is especially valuable to the United States, because, in all the essentials of political and social life, the two countries are the same. Both nations are democracies and both draw their fundamental institutions from the same source. Both represent the same mixture of people, with the great excep-

tion, of course, that the United States has no great compact Latin element, making up one third of its population, speaking what to the majority is a foreign tongue, tenaciously resisting assimilation, and clinging generation after generation to the civilization of two centuries ago. In their recent development, however, Canada and the United States have followed parallel lines. The history of immigration to Canada has been practically identical with that to the United States. Canada has a large quota of immigrants from the British Isles, as have we, and she has also her Germans, her Galicians, her Hungarians, her Italians, her Eastern Europeans and even her Orientals. At present, however, Canada's Germans have the greatest interest for the United States. This element in our own population, still jealously retaining its memories of the Fatherland and frequently blatant and tactless in expressing its loyalty to the *Deutchstum*, gives Americans most concern. In case we have war with Germany, what will the hyphenates do? Some regard these millions of German-Americans as little better than emissaries of Pan-Germanism, who, at a concerted signal, will rush to arms and convert the United States into an outpost of the Hohenzollerns.

On this point we can learn much from Canada. For there are German-Canadians as well as German-Americans. And they present just about the same aspects in both countries. There are perhaps 10,000,000 people in the United States who, in various ways, trace their racial origin more or less directly to Germany. This includes those actually born in Germany, and those who, for more than one generation, have a preponderance of German blood in their veins. As the population of the continental United States is about 100,000,000, this means that about 10 per cent. of our people are of German ancestry. Canada has roughly 400,000 Germans out of a total population of 7,200,000, or about 5½ per cent. The proportional German population is thus somewhat larger here than in the nation to the north, but not so much larger that it renders comparisons valueless. And German immigration has followed practically the same historic courses in both countries. The bulk of the German population, in the United States as well as in Canada, represents the influx of the years preceding 1870. These Germans came mainly from the southern parts of Germany; they were in many cases revolutionists and political refugees, or at least peace-loving Germans who left the Fatherland to escape the Prussianism that is now flaunting the world. In western Ontario there is a peninsula formed by Lake Erie, Lake Huron, and Georgian Bay; herein is situated Canada's Wisconsin—an area that contains a large German agricultural population, a considerable part of which has lived here for more than one generation. The very names of its towns—Berlin, Baden, New Hamburg, Guelph—indicate its origin. Berlin, the largest of these places, with a population of 15,000, of which 10,000 are German, is Canada's Milwaukee. The more recent German immigrants, of whom there are about 39,000, have settled, for the most part, in the recently opened Western provinces—Alberta, Saskatchewan, and British Columbia.

GERMAN-CANADIANS AND THE WAR

If Canada's experience with these German-Canadians is any guide, then the United States has little to fear from its Germanic elements. Berlin—the name has since been changed to Kitchener—for several months made the largest per capita contribution of any city in Canada to the Patriotic Fund. The Turn-Vereins and the Schuetzenbunds of German-Canadians have not turned out to be secret military organizations. Every singing society has not shown itself to be merely a branch office of the Pan-German League. In the early days reports were current that all the cellars in the German colony of Toronto were filled with German reservists fully equipped for war and that a million Germans had gathered in Buffalo for an invasion of Canada—but these stories faded on investigation. If the German-Canadians have been busy building artillery emplacements at advantageous points near the large cities, time has not yet revealed them. Practically all German-Canadians sympathize with Germany in the war, but this sympathy does not take the form of overt acts. A few have en-

listed in the Canadian forces, but not many —as a test of their loyalty, however, this is hardly fair, since German recruits are emphatically unwelcome. A very few Germans, practically all non-citizens, have made trouble, especially by giving expression to the Prussian passion for blowing things up. All such trouble makers, and all who give reasonable grounds for suspicion, have been interned. About 7,000 subjects of the Kaiser and Austria have lived in these internment camps; a majority, however, have been confined more from pity than from any other motive, as they were out of work, penniless, and destitute. In recent months several of these camps have been closed and the prisoners set free, so that now only about 3,000 subjects of the Central Empires are living in duress. For all practical purposes German-Canadians have given no trouble.

THE FRENCH-CANADIAN PROBLEM

But Canada has her racial problem, more deep seated and more serious than anything that can plague the United States. The war strengthened Canada's bonds with the Empire, but it has had a disuniting effect within the Dominion itself. Parliamentary debates upon the war make depressing reading, for they consist largely of racial recriminations. A general election this fall, which may take place, would be a most unfortunate thing, as it would degenerate largely into a mud-slinging contest between the French and English elements. For Canada's racial problem arises not from its recent immigrants, but from that part of the population which has been longest settled in the country. The fact is that the French-Canadians have not enlisted in any numbers at all proportionate to their strength. But the situation is too complex to be dismissed by a phrase. No one can accuse Jean Baptiste of cowardice —he is directly descended from the same ancestors as the defenders of Verdun, and, on more than one occasion, he has courageously defended Canada from invasion— as it happened, invasion from the United States. And, in the present war, the French-Canadian battalions have fought in France with the utmost heroism. When assailed in Parliament for disloyalty, the champions of the Frenchmen rise and point to the fact that, when the great schism came, it was John Bull's English-speaking colonies, not his French-speaking colonies, that broke the bonds with the mother country. Disloyal to the British connections the *habitant* certainly is not. He does not regard France as his fatherland, and, if given his free choice, would overwhelmingly accept Britain's overlordship in preference to that of his original allegiance. His sympathies in this war, as manifested in his newspapers, his daily speech, and his contributions to the Patriotic Fund, which have been almost as large as those of his English-speaking friends, are with the Allies. The position of the most influential French-Canadian leader, Sir Wilfrid Laurier, has been more than correct; no one has spoken so eloquently as he, in Parliament and out, for the English cause; he has traveled through Quebec, making recruiting speeches, and he has vigorously condemned certain French-Canadian politicians, such as Bourassa, who are openly anti-English in their sympathies. It is true that his attitude, especially in recent months, has offended his Conservative opponents and has led to half-suppressed accusations of disloyalty. While the Opposition supports as strongly as ever Canada's participation in the war, it reserves the right to criticize its actual management, and Sir Wilfrid has done this so unsparingly and so directly that, in ultra-Conservative quarters, he is looked upon almost as a public enemy. It is also true, that, in a recent by-election in Dorchester, Quebec, he openly endorsed the candidacy of the Liberal candidate, whose utterances on the war seemed virtually seditious. But no serious person questions Sir Wilfrid's devotion to the cause of England and her Allies.

Still, the ugly, outstanding fact is that French-Canada has enlisted in most inadequate numbers. Practically all Canadians, when questioned on this tender subject, place the blame upon the Roman Catholic Church. That the hierarchy have officially encouraged recruiting, is admitted, and, most people believe sincerely enough. But the influence of the parish priest, who comes into daily intimate

contact with the *habitant*, is apparently against participation in the war. Quebec is full of religious orders expelled from France by the anti-clerical laws passed in recent years, and the general feeling of the devout French-Canadian Catholic is that France is an atheistical country which God is now punishing for its sins. Possibly this explains the comparatively light recruiting in Quebec; yet we must remember that the French-Canadian is a simple, peaceful creature, to whom the war is so remote that it makes little impression on his imagination, and who cannot yet understand why he should cross the sea for three thousand miles and risk his life in a cause the meaning of which he does not faintly comprehend. He does not read blue books or white papers, European diplomacy of the last twenty-five years concerns him little, and his mind cannot spring far enough ahead to associate the triumph of England with the ultimate security of his own beloved Canada. If Hindenburg were pounding at the gates of Quebec, there is little question that the French-Canadian would shoulder his rifle; but Hindenburg in the Carpathians or the Russian morasses does not strike him as anything that threatens his own parish. Again, the French-Canadian marries when very young and has an astonishingly large family—twelve and fifteen children being not uncommon. Under any proper system of military service he would be among the last to be called to the colors.

CANADA'S LARGE ENLISTMENT

From the military standpoint, Canada presents the spectacle of a democracy waging war in the way that democracies have usually waged war—on the voluntary system. She has given men to an extent that has far exceeded the expectations entertained at the beginning of the war. It was then suggested that a Canadian army of 100,000 or 150,000 men would be an heroic contribution to the cause. Up to January 22, 1917, the actual number of Canadians enlisted was 392,647—these were the figures given by Sir Robert Borden in the House of Commons. Up to December 31, 1916, Canada had sent overseas 280,562 men, besides a considerable contribution to the naval service, to British munition works, and to other departments in England. More than 175,000 Canadians have seen service at the front, either in France or the Near East. Canada keeps continuously four divisions, or from 80,000 to 90,000 men on the scene of war. Up to date she has had 70,000 casualties; 10,000 men have been killed in action, 4,000 have died of wounds, and 48,000 have been disabled. Canada's military establishment is twice as large as England's before 1914.

But, properly to appreciate the magnitude of this effort, let us seek comparisons that will bring it nearer home. The continental population of the United States —exclusive of dependencies—is about thirteen times as large as that of Canada; if we, therefore, multiply all these items by thirteen, we shall have the magnitude of Canada's performance, measured in terms of our own capacity. That is, if we should do no more than Canada has done, we should enlist roughly 5,000,000 men, send overseas 3,640,000, of whom 2,275,000 would have already have seen service at the front. We should constantly keep in the fighting line fifty-two divisions, or about 1,000,000 soldiers. Our casualties would have reached, up to date, 910,000, and nearly 200,000 Americans would have sacrificed their lives. Certainly, if the United States could show any such record as this, we should probably think that we had made a solid contribution to the cause of justice and civilization. And these figures represent precisely what Canada has done.

EVILS OF THE VOLUNTEER SYSTEM

Yet this achievement has another value for us, in that it illustrates all the inequalities and injustices of the voluntary system. Most Canadian officials, in discussing the situation with me, emphasized the fact that, if the United States goes to war, it should profit from Canada's experience and adopt conscription at once. In a recent statement in Parliament, Sir Sam Hughes, the ex-Minister of Militia, said that, based upon the census of 1911, Canada contained 1,720,000 men between the ages of 18 and 45. This represents the military resources of the nation, so far as

men are concerned. Of these 1,088,000 are unmarried. This is the class which, under universal service, should be the first called upon. The present enrolment, according to Sir Sam, comprises roughly 100,000 married men and 300,000 single. On this basis, Canada has at least 700,000 unmarried men upon whom she still can draw for recruits. It is absurd that, with this large population of men without family responsibilities, there should be 100,000 married men in Canada's armies. Not only is it a social crime to enlist married men when the nation is apparently swarming with slackers in a state of bachelorhood, but it entails great expenditures, from both the private and the public purse. The Patriotic Fund canvasses the whole Dominion for money to support the dependents of her soldiers, who already receive the highest pay of any in the world, and Canada has started a pension system which promises to become far more extravagant and give rise to more frauds and scandals even than our own. Such expenditures would be greatly reduced under conscription.

But the voluntary scheme works great injustice not only between married and unmarried, but between different localities. Here, for example, are instructive figures; they show the enlistments in the several provinces and the contribution each province has made per thousand of population:

ENLISTMENTS UP TO DECEMBER 31, 1916

PROVINCES	NUMBER ENROLLED	ENLISTMENTS PER 1,000 OF POPULATION
Ontario	157,908	63
Quebec	41,729	20
Maritime Provinces: New Brunswick, Nova Scotia, Prince Edward's Island	34,802	38
Manitoba and Saskatchewan	77,254	81
Alberta	34,517	92
British Columbia	37,575	104
	383,785	

Now let us take a table that is even more suggestive. On January 1, 1916, Sir Robert Borden issued a call for 500,000 men. This, he said, would represent Canada's contribution to the cause. Public opinion in Canada enthusiastically endorsed this call and regarded the quota demanded as reasonably representing Canada's contribution. Unfortunately Canada has not yet obtained these men; since recruiting, in the last few months, has almost ceased, there seems little likelihood that, under the voluntary system, she will ever obtain them. The failure to realize expectations is caused simply by the fact that certain parts of the country have shirked and attempted to shift the burden upon others. The first column in the following table shows the number of men which each section should have contributed to this 500,000, had each contributed in proportion to its population. The second shows the percentage of its allotment which each section has actually put into the field:

PROVINCES	PROPORTIONATE ALLOTMENT	PERCENTAGE OF ALLOTMENT ENLISTED
Ontario	170,213	93
Quebec	138,298	30
Maritime Provinces	65,957	53
Manitoba and Saskatchewan	70,213	110
Alberta	25,568	135
British Columbia	29,787	126

These figures have the utmost interest for Americans; they show precisely what would happen here, if we adopted the voluntary system. Certain sections of Canada have contributed more than their fair share; other sections have contributed less. Quebec makes the poorest showing, but it evidently is not the only province that has held back, for the Maritime Provinces—New Brunswick, Nova Scotia, and Prince Edward's Island—have furnished only a little more than half their allotment. Even Ontario, the great headquarters of Imperialism, has not furnished its 100 per cent., though its showing is more than respectable. Perhaps the fact that there are large numbers of unmarried men in these Western provinces—mostly immigrants from England—explains this showing, but such facts do not explain the discrepancy between the old established maritime provinces and Ontario. On the other hand, the Western provinces have done far more than their share. If Quebec had enlisted at the same rate as Ontario, it would have given the army not 41,000 men, but 128,000. Montreal, the largest city in Canada, has

enlisted 34,000, while Toronto, which is considerably smaller, has given 85,000. "We could get 500,000 easily if Quebec would do her duty," is the cry heard all over Canada. Only conscription can remedy such inequalities, but there is little chance of conscription in Canada, as it would produce an ugly situation in the great French-Canadian province. Fortunately the United States is a much more united country; we have no bi-lingual system, no religious schools supported at public expense, and no clerical problems.

INDISCRIMINATE ENROLLMENT

All the other faults urged against voluntarism likewise find their illustration in Canada. Recruiting has been haphazard, and has led to great wastage. The unit has been the battalion—about 1,200 men. Individuals have received authorizations to establish recruiting headquarters in different districts and such men, whose appointments have been in some cases political, have resorted to all kinds of methods in filling out their battalions. Frequently competition between such recruiting agents, operating at cross purposes in the same part of the country, led to the utmost confusion and waste of effort. The leaders have enlisted men from the mines, when the working of the mines was absolutely essential to the prosecution of war. They have taken recruits from the munition factories, where, of course, their recruits would be more useful than in the trenches. They have robbed the fields of harvesters whose work has been essential to maintaining Canada's greatest industy—her agriculture. There has thus been no intelligent effort to assemble the nation's resources and to fit each person into his particular niche. Most serious of all, the medical inspection has been faulty; so eagerly have the officers sought recruits that unfit men, apparently in large numbers, have slipped through. Not infrequently an ambitious recruit, rejected by one physician, would go the rounds until he found some one who, either through ignorance or indulgence, would certify to his physical well-being. As a result thousands of men have been sent to England who have gone to pieces there and been returned home. According to an estimate made by Mr. Godfrey, president of the National Service League of Toronto, such wastage up to date amounts to 60,000 men. If that statement is accurate, we shall have to revise somewhat the official figure of volunteers. Instead of having enrolled 392,000 fighting men, Canada has furnished only 332,000; certainly no one would include 60,000 ineffectives as real contributions to the Allied armies, for these men become simply burdens, involving great trouble and expense.

THE TRAGEDY OF CANADA'S OFFICERS

Canada is complaining loudly at present of the treatment these battalions have received in England. While they were being enlisted, the recruits believed that their organizations were to be maintained intact. Localities naturally had particular pride in their battalions; brothers and friends enlisted together, believing that they would remain together at the front; and officers, many of them leading men in their sections, have organized their forces supposing that they would command them in France. The reality has furnished Canada the bitterest disappointment of the war. Modern military science pays no attention to sentiment; it takes men where it can find them and places them where they can perform the greatest military service. The Canadian forces in France have had heavy losses, and men have been constantly needed to fill out their depleted ranks. Consequently, the battalions, as soon as they have arrived in England, have been broken up. A few hundred have been taken to fill a certain gap in France; a few more hundred to fill another gap, and in this way the organizations have disappeared piecemeal. Thus men from Edmonton, instead of finding themselves fighting side by side with Edmonton men, have formed part of a miscellaneous force—nearly all strangers—from all parts of Canada. This is not so hard on the men—though they have complained loudly—but it has been a tragedy for the officers. The battalions have been so depleted that these men, in large numbers, have found themselves without commands—their men at the front are in the hands of English officers or in the hands of Canadians who have been

promoted—and properly promoted—from the ranks. These men left Canada under brilliant auspices; they were fêted and dined, and sent abroad with great applause and expectation. They gave up their business and professional careers to serve their country, but many are now wandering over England, or living in hotels in London, ashamed to return home. What explanation can they give for the greatest tragedy that can happen to an officer—the loss of his command? They cannot tell their people that the blame attaches to the fact that they were enrolled under an unscientific military system, and they are thus likely to be the victims of cruel innuendoes as long as they live.

SIR SAM HUGHES AND KITCHENER

In the production of equipment and munitions Canada has blundered along in most approved democratic fashion. This is perhaps not strange, when we remember that, at the outbreak of war, the Dominion possessed only one factory in which rifles were produced and had absolutely no establishments for making shells, guns, and other essential implements of war. From the first Canada has been extremely desirous of obtaining war contracts and watched with great jealousy the huge orders given in the United States. As soon as it demonstrated its ability to handle such contracts they came in large numbers. Up to date the Dominion has produced about $700,000,000 worth of munitions. Unlike England and France, the Canadian Government has not taken over the munition factories, has not regulated earnings, and has not taxed munition profits. The Shell Committee, organized by Sir Sam Hughes for handling munition contracts, has furnished those scandals without which it seems almost impossible to conduct military operations. Two experiences illustrate the absurdity of attempting to conduct war without a scientific coördination of munition production. Sir Sam Hughes's incumbency as Militia Minister was one continued wrangle between his own vigorous personality and the British War Office. The tart telegrams exchanged between this somewhat obstreperous Orangeman and Kitchener make rather entertaining reading. The chief source of the ill-feeling was caused by the fact that Canadian equipment, as soon as it arrived in England, was scrapped and supplanted by that of English make. The money wasted in this way amounted to millions. The wrath of Canadians over this summary treatment was so great, declared Sir Sam in Parliament, "that every man who came home invalided, and every letter from the front, talked of another Boston tea party." The explanation made by the British War Office—and it seems satisfactory—was that, since all the Imperial forces worked as a unit, it was necessary that they all have the same equipment. The absurdity of the situation was that Canada should go on, month after month, sending millions of dollars' worth of equipment to England, which was thrown upon the scrap heap as soon as it arrived.

THE BLUNDER OF THE ROSS RIFLE

The story of the Ross rifle likewise shows the necessity of unified action. At the beginning Canada took great pride in the fact that its Army was equipped with this rifle, which is the invention of a Canadian and which is manufactured in Canada. Yet the history of the Ross rifle has been a distressing one. It received its first test at the battle of St. Julien, in April, 1915, and failed wretchedly. Because so many of their rifles jammed, the Canadians found themselves fighting Germans with practically no means of defense, and probably a considerable number of the casualties are attributable to this fact. In June, 1915, Sir John French informed the Canadian authorities that the Canadian soldiers had lost confidence in their arm and were throwing away their Ross rifles whenever they could obtain Lee-Enfields "from casualties." Despite this, the Canadian militia office continued to send the Ross rifle to the front. In May, 1916, Sir Douglas Haig declared, in an official dispatch, that there had been a "high percentage of jams with the Ross rifle during a hostile attack on May 1, 1916." That is, a year after Sir John French had informed the Canadian authorities that the Ross rifle endangered the

lives of Canadian soldiers, it was still being supplied to the troops. In August, 1916, the work began of equipping Canadian troops with the regulation British arm, the Lee-Enfield.

Conditions in munitions work have now improved, the Shell Committee has been abolished and a new agency, the Imperial Munitions Board, has been organized under the chairmanship of Mr. J. W. Flavelle. This board supervises all the Imperial munition contracts let in Canada. Under its direction munition plants have been established in every province, about 300,000 workmen are employed, and nearly $1,000,000 a day is being spent. There is still much hard feeling in Canada because huge profits are paid to munition makers—a Montreal ammunition company has recently declared a dividend of 800 per cent.—but this does not overshadow the amazing energy with which Canada has transformed itself into a gigantic arsenal, almost overnight. There is practically no part of the country in which war supplies are not now produced. The remotest towns in Alberta and British Columbia are daily sending their shipments of war material to England.

FINANCIAL HELP

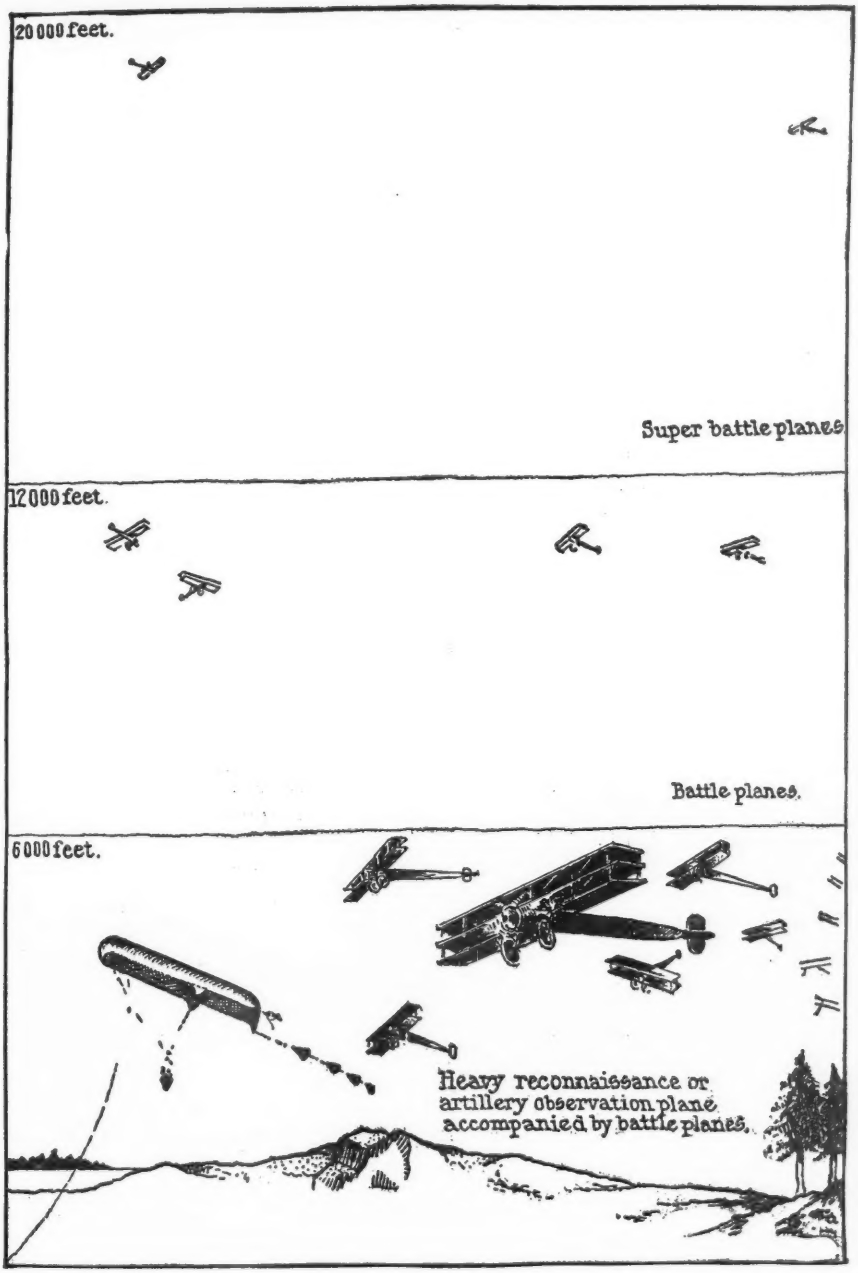
Perhaps Canada's greatest triumph is the financial support she has brought to the war. Sir Thomas White, Minister of Finance, seems to have made the greatest personal success of any man in the cabinet. The war, as already said, found Canada's economic position a weak one. Business was depressed and the debt to English bankers was large. Canada, even more than the United States, was a debtor nation, regularly borrowing about a million dollars a day in the English market. Though the Dominion's economic resources were extensive, the amount of liquid capital available was small. When the war began it was taken for granted that Canada, like France, Russia, and other of the Allies, would have to be materially helped from the Imperial Treasury. But Canada has developed unexpected financial strength. Like the United States, the Dominion has profited enormously from war orders. Her position recalls that of Great Britain in the Napoleonic wars; then England, although herself at war, had great prosperity, largely owing to the fact that her own territory was not ravaged, that her farms—English agriculture was then important—were feed the European armies, and that her factories were supplying them with munitions. Canadians have had an unexpected influx of money, and they have used it in enthusiastically subscribing to war loans. In 1915 the Government rather timorously offered its first loan—one for $50,000,000; the response was so immediate and generous that the amount was increased to $100,000,000. Last year it called for another $100,000,000, which was also greatly over-subscribed. Besides this the Dominion Government has borrowed $125,000,000 in New York, and the loans placed by Canadian provinces and municipalities in the United States have amounted to much more; indeed, Canada's credit stands so high on this side that her securities are eagerly snapped up by American investors, and we have practically taken the place of England in financing the Dominion. Besides these transactions, the Canadian banks have provided England with a credit of $250,000,000 to pay for war munitions. In other words, Canada, instead of being financed by the mother country, is not only financing herself but is helping to finance England also. The war has already cost Canada about $500,000,000, and she is spending now nearly one million dollars a day.

Despite this great strain, Canada shows every determination to see the thing through. Probably the quality that the United States could best imitate is the spirit of the people. Disloyalists and grafters there are, but they are a minority. It is to be hoped, if the American people get into the war, that we shall profit from Canada's mistakes and organize more scientifically our resources and our men. But we cannot show a higher devotion to what is every day regarded more and more as a sacred cause. Canada's spirit, combined with our infinitely greater resources, would quickly turn the scale in the European conflict.

WHAT YOU SEE AT THE FRONT

A PICTURE OF THE TRENCHES AND WHAT ARE BEHIND THEM, MADE BY DETAILED MAPS, DIAGRAMS, AND PHOTOGRAPHS

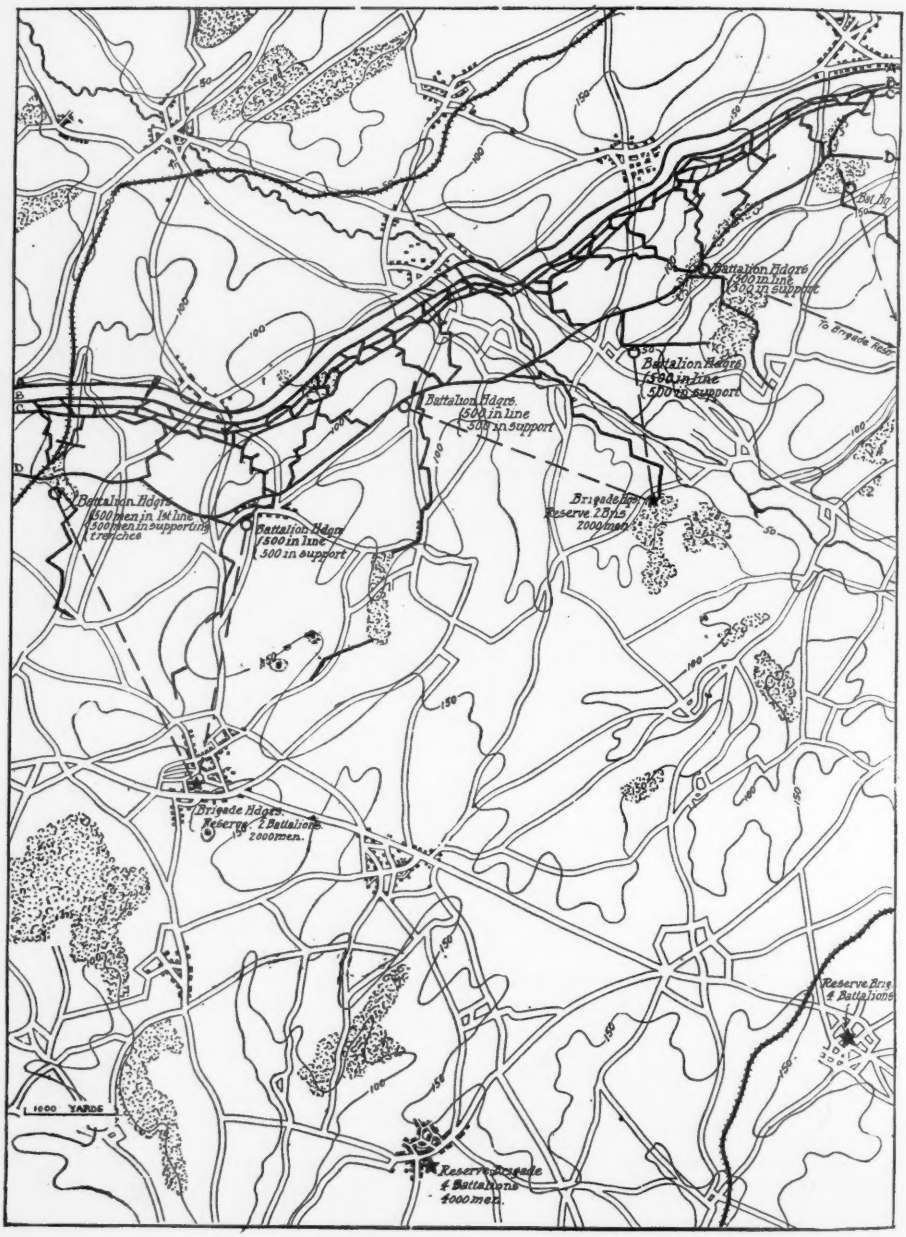
THE BATTLEFIELD pictured is a typical trench line but not at a point of heavy attack. The maps, diagrams, and pictures give a fair idea of many places on the battle lines in Europe. But it is necessary to remember that while conditions in all parts of the line bear some resemblance to each other, trench conditions are not exactly the same in any two places.



THE AIR-ZONES OF A MODERN BATTLE

From the ground up to 6,000 feet is the zone in which the heavy aircraft usually operate. They are used for artillery observation, for photographic work, and for bomb dropping. In this area also are the captive balloons which direct the fire of the heavy artillery. (See map on page 606.)

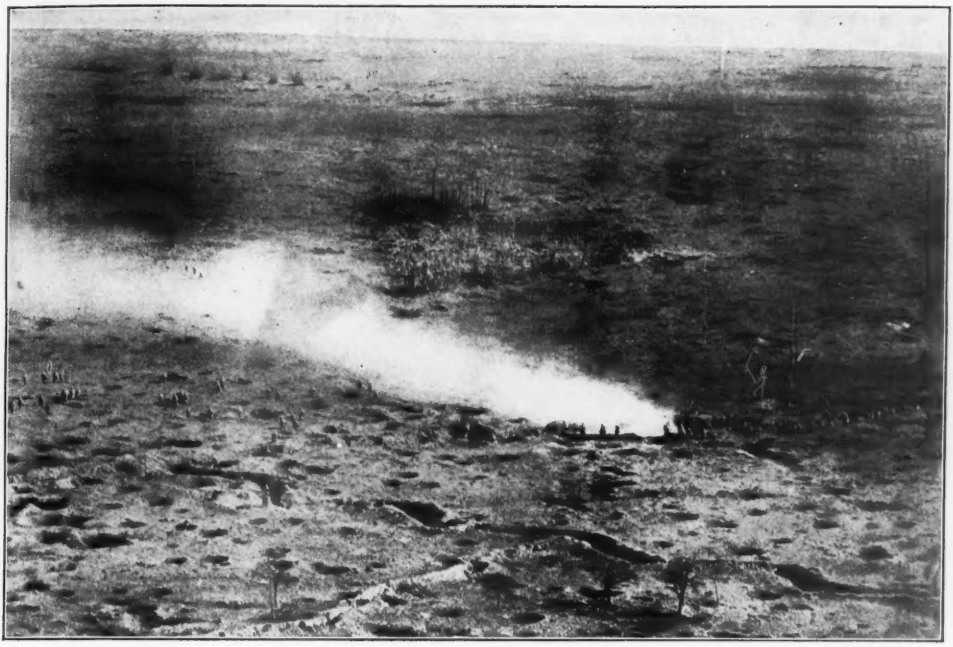
Between 6,000 and 12,000 feet is the zone of the battle-planes that struggle for the mastery of their zone, which will give them an opportunity to attack or protect the slower machines and balloons below them. The improvement in machines during the last year has made possible a still higher zone in which what might be called destroyer-planes operate so as to have an advantage of position from which to attack.



A MODERN BATTLE FRONT

A typical section of trench line of about six miles showing (A) enemy first line, (B) first line, and the supporting and communication trenches behind, with the disposition and numbers of the troops in the first line, in support, and in reserve. A section of front held by one battalion (1,000 men) may be from 250 to 1,000 yards long, or more than half a mile. Half the battalion is in the first line and the other half in support in the other trenches. Behind these are an equal number of reserves at brigade headquarters, and still further back another force equal to all these to alternate with them. For each man in the first firing line, there are seven others in reserve, not counting artillerymen, medical men, etc.

The contour lines, showing the ground elevation in metres (3.28 feet), are important, as they show the reason for the location of batteries, trenches, hospitals, etc. on this and on maps on succeeding pages. Parallel lines indicate roadways, heavy crossed lines are railroads, and shaded sections are woods.



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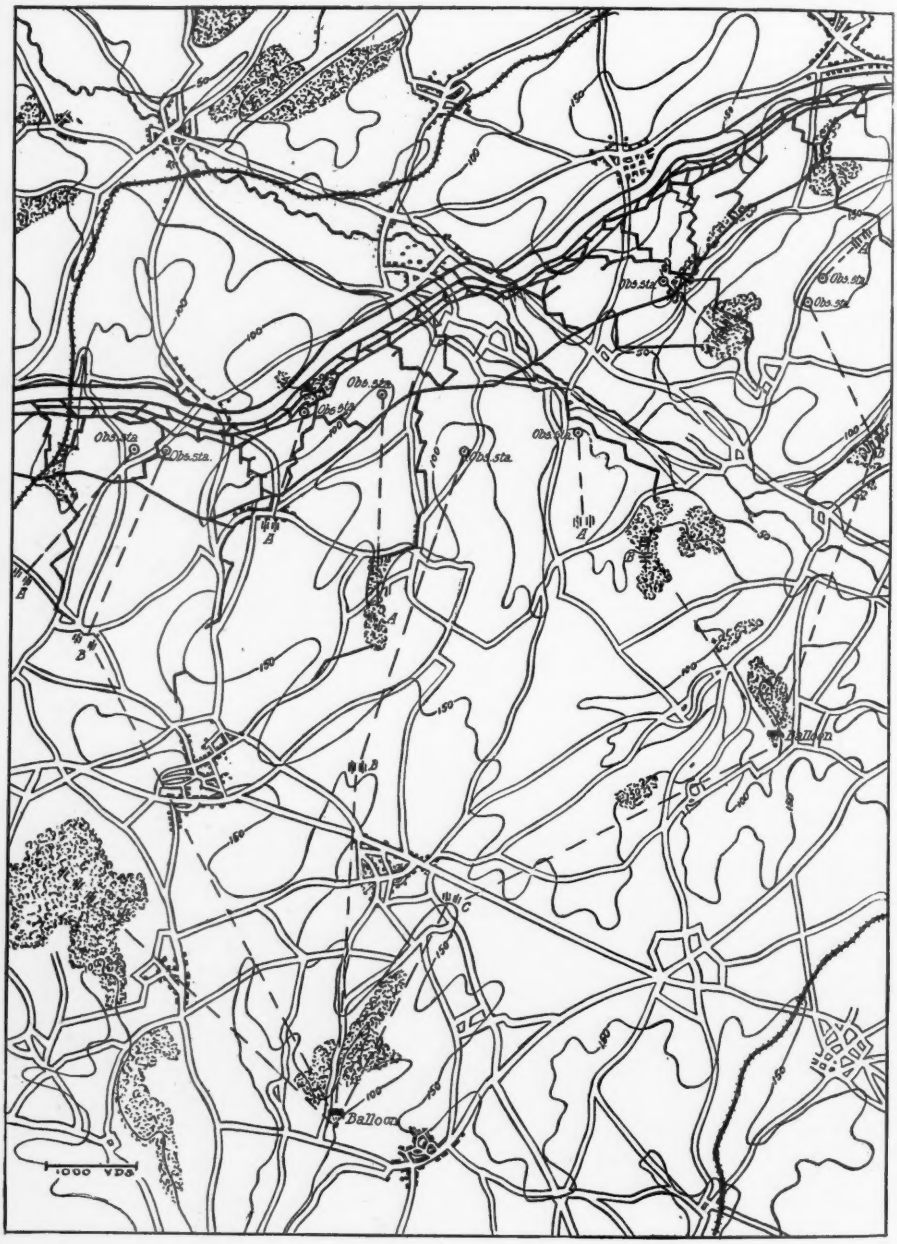
A MODERN BATTLE FRONT

Showing an attack. The men in the foreground leaving their trench, corresponding to "B" on the map on the opposite page, are charging toward the trench line, corresponding to "A," visible in the background of the picture

AN ATTACK—CROSSING "NO MAN'S LAND"

What the trench lines look like in a chalk country. The troops are leaving trench corresponding to "B" on the map and attacking "A." The supporting and communication trenches show plainly



ARTILLERY POSITIONS AND OBSERVATION STATIONS

The light batteries, marked "A," consisting of 3-inch field guns (18-pounder guns and 75-millimetre guns) and howitzers up to 4.5 inches, and the medium batteries, marked "B," of field guns up to 4.5 inches calibre (105-millimetre field guns, 60-pounders, and 155-millimetre howitzers) have their fire directed from observation stations (marked "Obs. sta.") and regulated by airplane observers. The heavy batteries are usually directed by balloon observation and regulated by airplane observation. The batteries are usually placed behind the crest of a hill or under cover of woods and buildings and as often as possible where they can enfilade a part of the enemy's trench, as shown by the second "B" battery from the right, which has the railroad crossing and enemy's trench within range. Enfilading fire is more accurate than frontal fire, for the lateral error of artillery is from one third to one seventh as great as the range error

AN OBSERVATION BALLOON LANDING

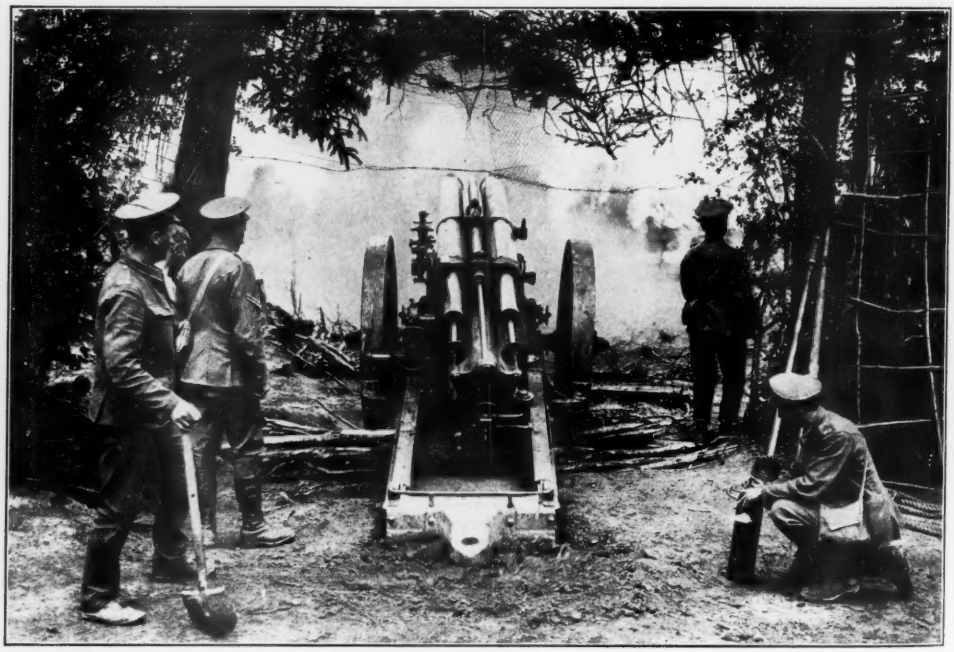
The balloons on the map on the opposite page are about two miles from the firing line. In practice they are pushed up as far forward as the control of the air will allow

A HEAVY 6-INCH GUN

The fire of the heavy guns is chiefly directed by balloon observation. The usual position of the guns is from three to six miles from the enemy first line (see "C," on map on facing page). Their duty is to bombard and destroy supporting points, communications, dugouts and trenches, and headquarters if it can be located. The effective range of a 6-inch gun is about 15,000 yards

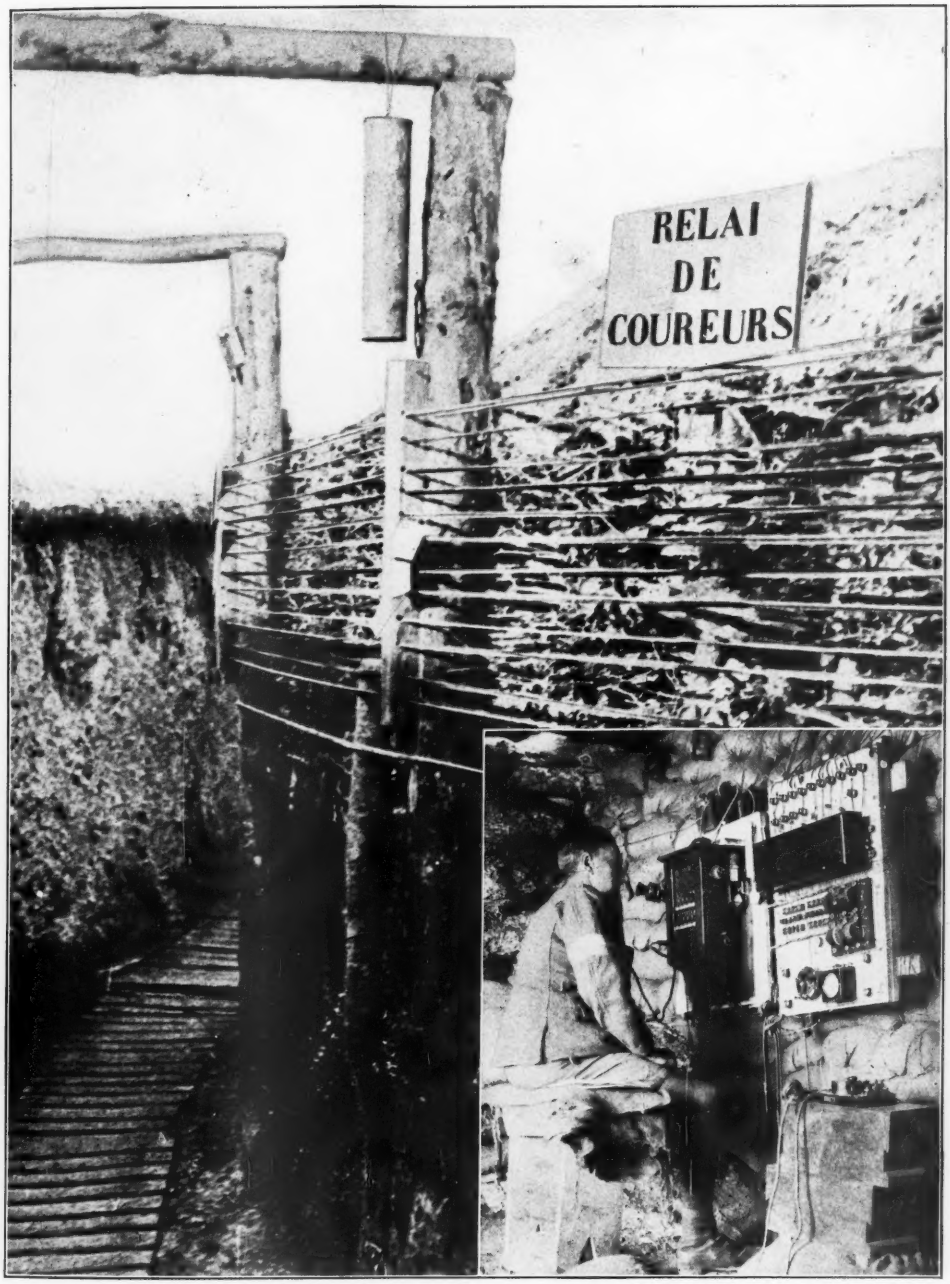
AN OBSERVATION STATION

They are placed anywhere—in buildings, trees, shell craters, etc.—from which the observer can see the effect of his batteries' fire and from which he can get wire communication back to his guns, and where he can report the movements of his own and the enemy's infantry. (Marked "Obs. sta." on map on page 606)



GUN OF A MEDIUM BATTERY

The gunners know the results of their fire only by reports from their observers. Medium batteries ("B" on map, page 606) are located from one to three miles from the enemy, and their task is to help destroy enemy trenches, try to put enemy batteries and captive balloons out of commission, and they are also used in barrage fire to cover attacks



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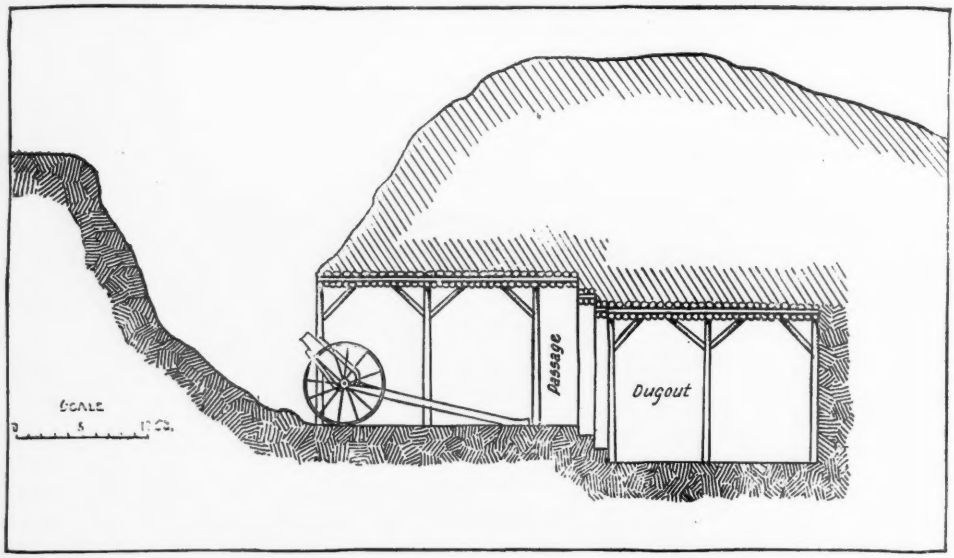
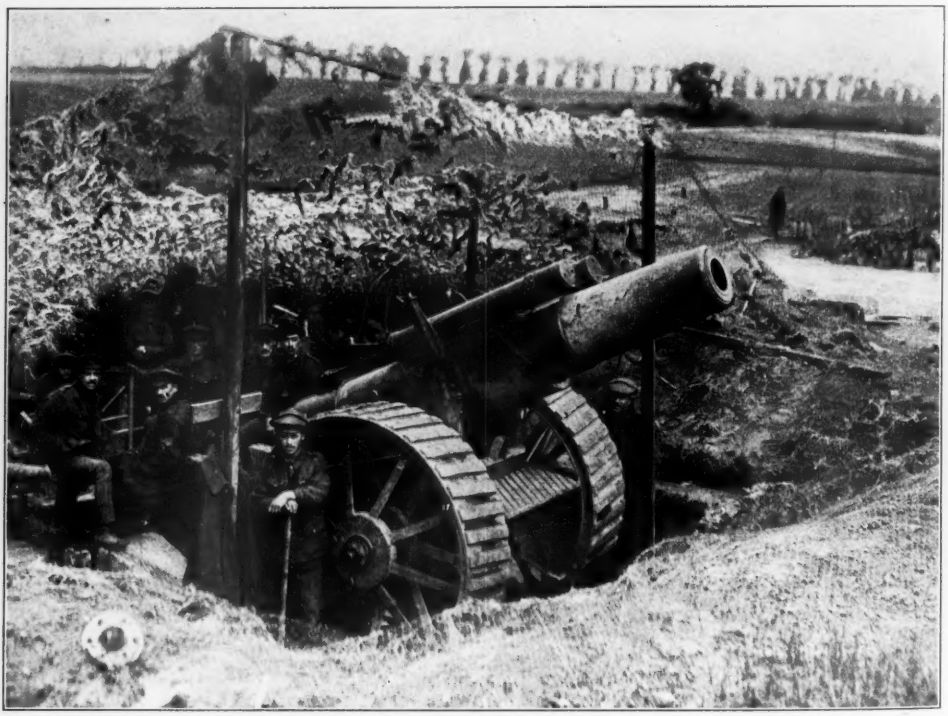
A COMMUNICATION TRENCH, TELEPHONE WIRES, AND GAS ALARM

A typical trench braced to prevent caving in, with the usual board walk and the great number of telephone and telegraph lines in a modern communication system. The shell case is struck as a warning for all to put on masks, when a gas attack is discovered. (*Inset*) A telephone exchange in a dugout which is part of the system of communications between the front lines and the headquarters in the rear



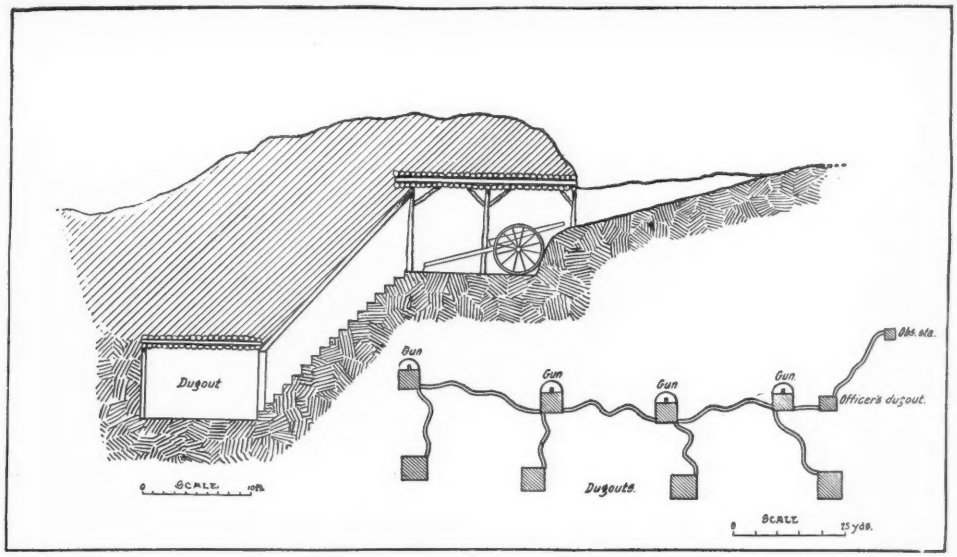
A DIAGRAM OF AN INTRENCHED HOWITZER

A plan often used to conceal and protect both the batteries and the men from enemy observation and fire. The gun crews live in the dugouts in the rear. In many of the gun positions on the map on page 606 this intrenchment would not be necessary, for the batteries and crews are placed in positions sufficiently concealed to protect them



A HEAVY HOWITZER BEING INTRENCHED

Artillerymen engaged in placing a gun in a position like that in the diagram above. The position of this gun, or more particularly of the one above, will explain why it is difficult to move heavy artillery rapidly either to follow up an attack or to escape an advancing enemy

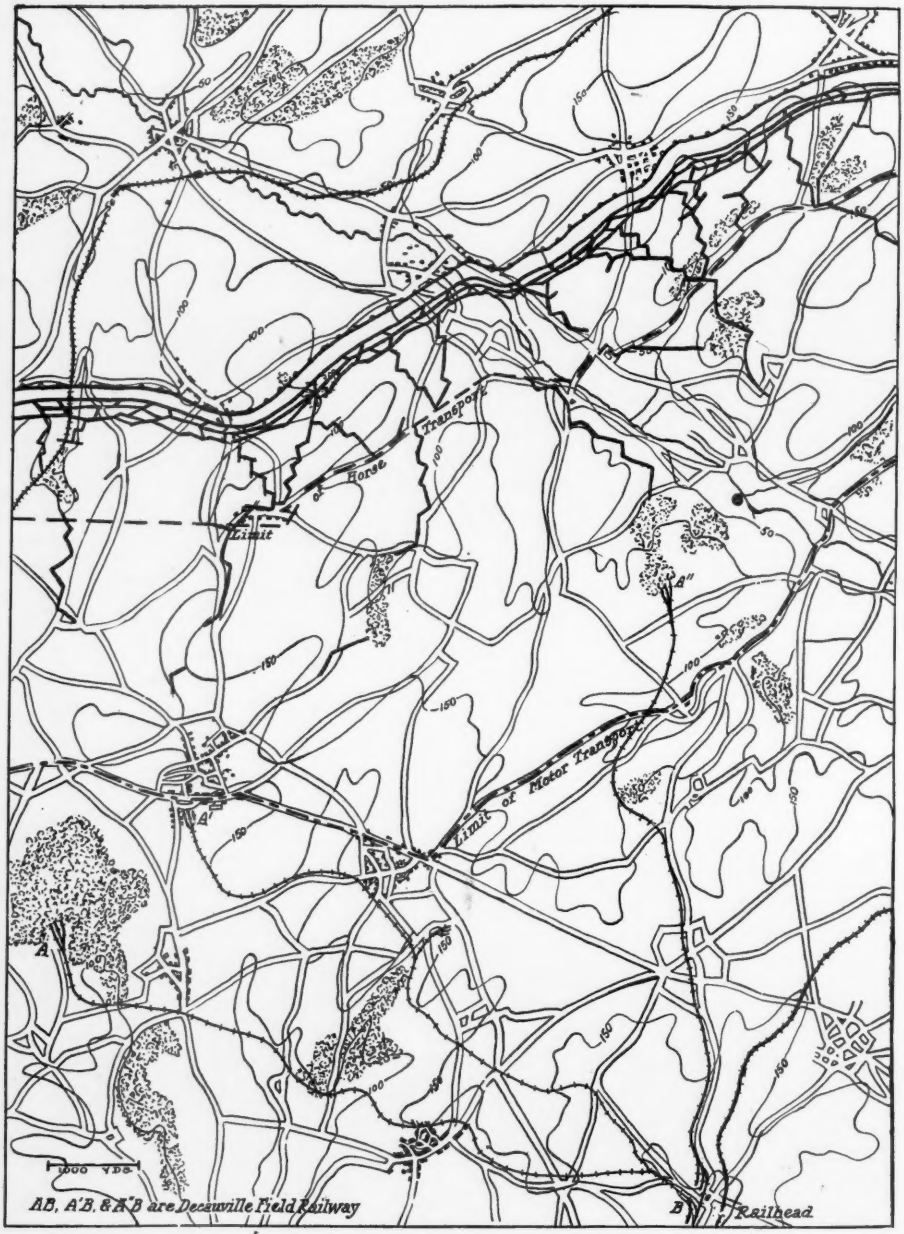


AN INTRENCHED LIGHT BATTERY

A diagram of the protection of each gun and a map of a battery with dugouts for men and officers and communication trenches between and an observation station near by, as shown in the extreme right-hand light battery ("A") on map on page 606

A LIGHT GUN'S INTRENCHMENT

With the curtain that conceals it from aërial observation drawn. The second light battery ("A") from the left on the map on page 607 is intrenched in a town as in this picture. These guns are used to cut wire entanglements, destroy parapets, silence enemy artillery, and for barrage fire either with or without gas shells



TRANSPORTATION SYSTEM BEHIND THE LINES

When possible, broad-gauge railroads are utilized to within about ten miles of the line. They are often supplemented by motor transport, and this also carries to within three or four miles of the front and sometimes closer. Horse transport is used in the field trains of the troops up to the second line, where bearers take the material. The Decauville field railways supplement this system, especially for the transporting of ammunition, and sometimes these light lines reach into the trenches.

In this map the Decauville railways are shown reaching brigade headquarters, shown on the map on page 604, the different batteries shown on page 606, and a field hospital shown on page 616. In quiet times on the lines 18,000 men would take at least 250 tons of food, munitions, and accessories a day.

RAILHEAD: AMMUNITION AND STORES FOR THE FRONT

The map on the opposite page shows the railhead about ten miles from the lines. From here the railroad freight moves forward by motor and light railroad

FROM RAILHEAD TO THE GUNS

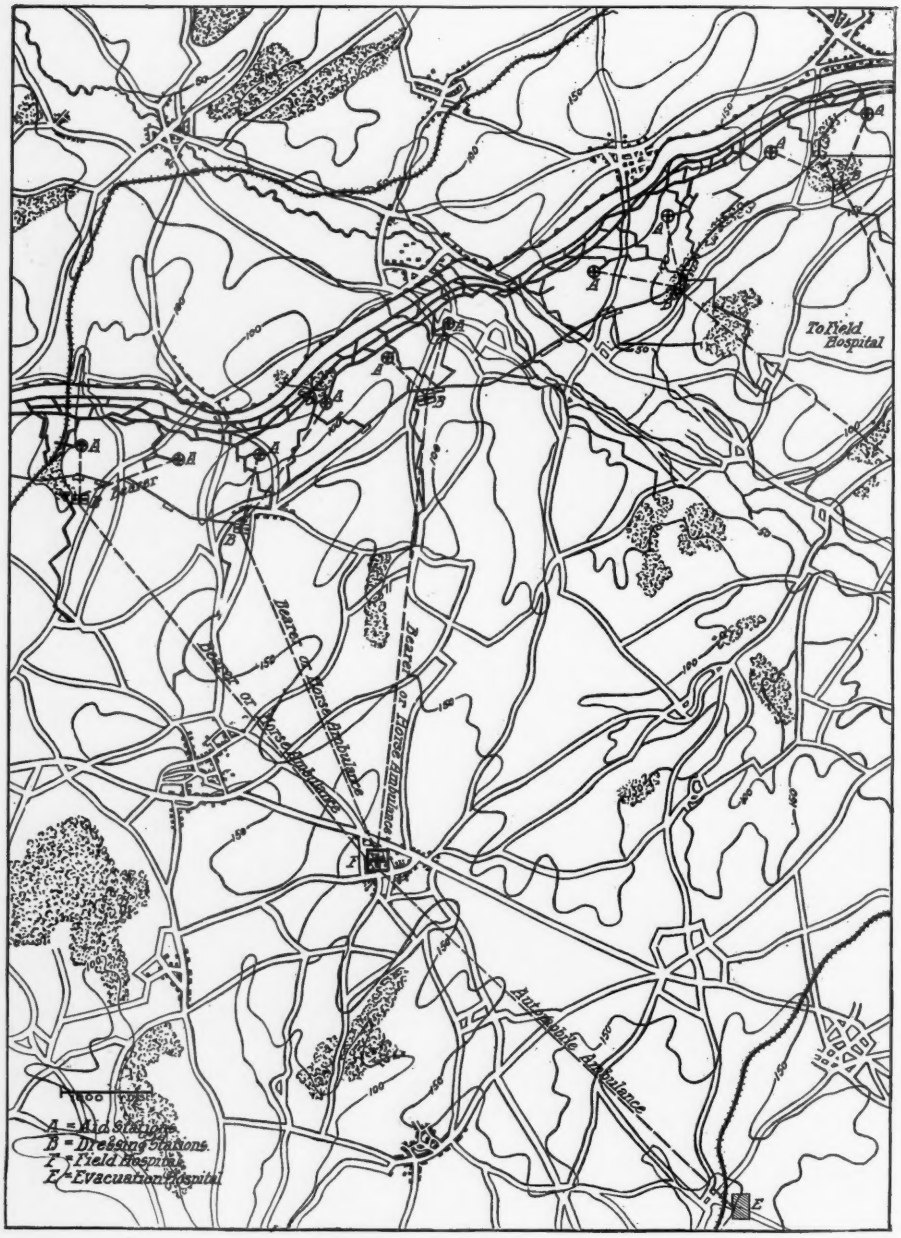
A light railway carrying ammunition. On the map opposite. These light railways serve several batteries, brigade headquarters, and the field hospital. (Compare with maps on pages 604 and 616.) They are run, when possible, behind hills or woods, out of sight of the enemy

MAN, HORSE, AND MOTOR

A bombing squad with its boxes of bombs approaching an entrance to the communication trenches as shown on map on page 612 and diagram on page 621. (Centre) Horse transport under conditions that the motor cannot meet. Carrying shells to the light batteries. (Below) From the bases to well beyond railhead and also for use between railhead and the motor limit (see map on page 612). The motor transports go in trains of cars of the same type and make and are sometimes linked together

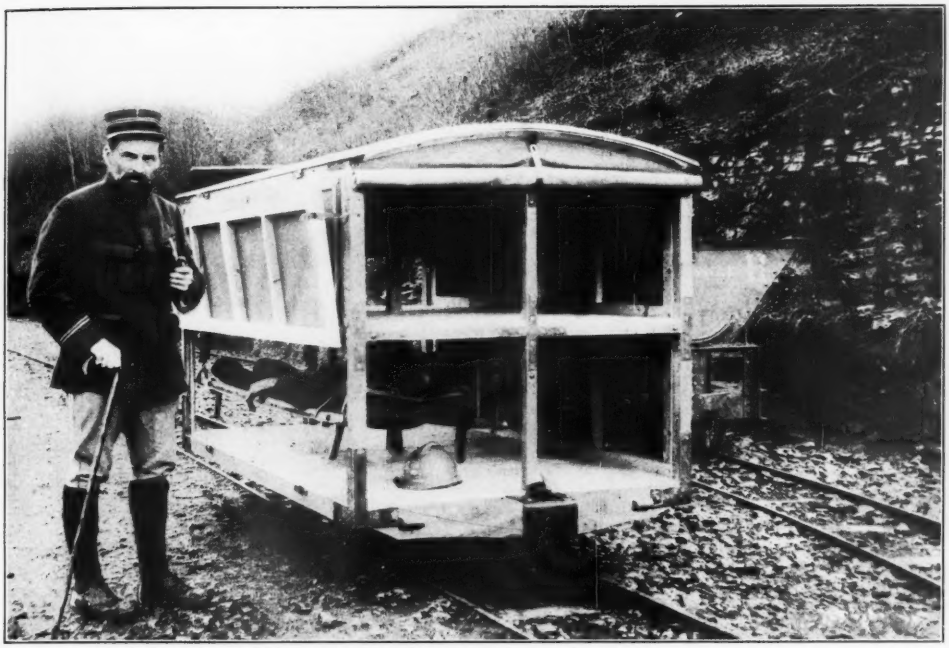
THE RED CROSS ON THE BATTLEFIELD

(Upper left) An aid station in the trenches (see map on page 616), where the wounded receive doctor's care and are prepared to be sent back to the dressing stations. (Right) A wounded soldier in the trenches, bandaged and ready to be taken to the aid station. (Lower left) From the dressing station to field hospital by bearer and (right) by horse ambulance. (See medical map on page 616 and compare with transportation map on page 612)



THE MEDICAL MAP OF THE FRONT

Men wounded in the front trenches or in "No Man's Land" are rescued by stretcher-bearers or comrades, given immediate aid with the first-aid packet, and then carried to the aid stations in the communication trenches, marked "A" (see also diagram on page 621). In many cases stretchers cannot be used because of the sharp turns in the trenches. From the aid stations the wounded are removed to dressing stations out of the trenches and from there either by bearers or horse ambulances to the field hospital. As soon as they are well enough they are shipped by automobile ambulance or on the Decauville light railway to evacuation hospitals at varying distances behind the lines and by train to the hospitals in the large cities. The fundamental idea underlying the system is to accomplish each move away from the front as soon as the patient has been got into condition in which he can stand it. This map shows a typical arrangement, but under different conditions, of course, it varies greatly

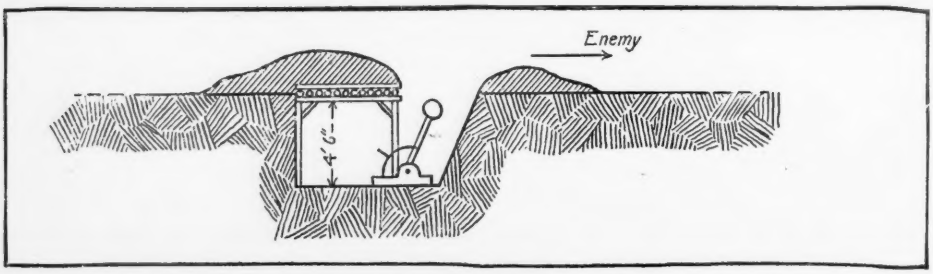


FROM FIELD TO EVACUATION HOSPITAL

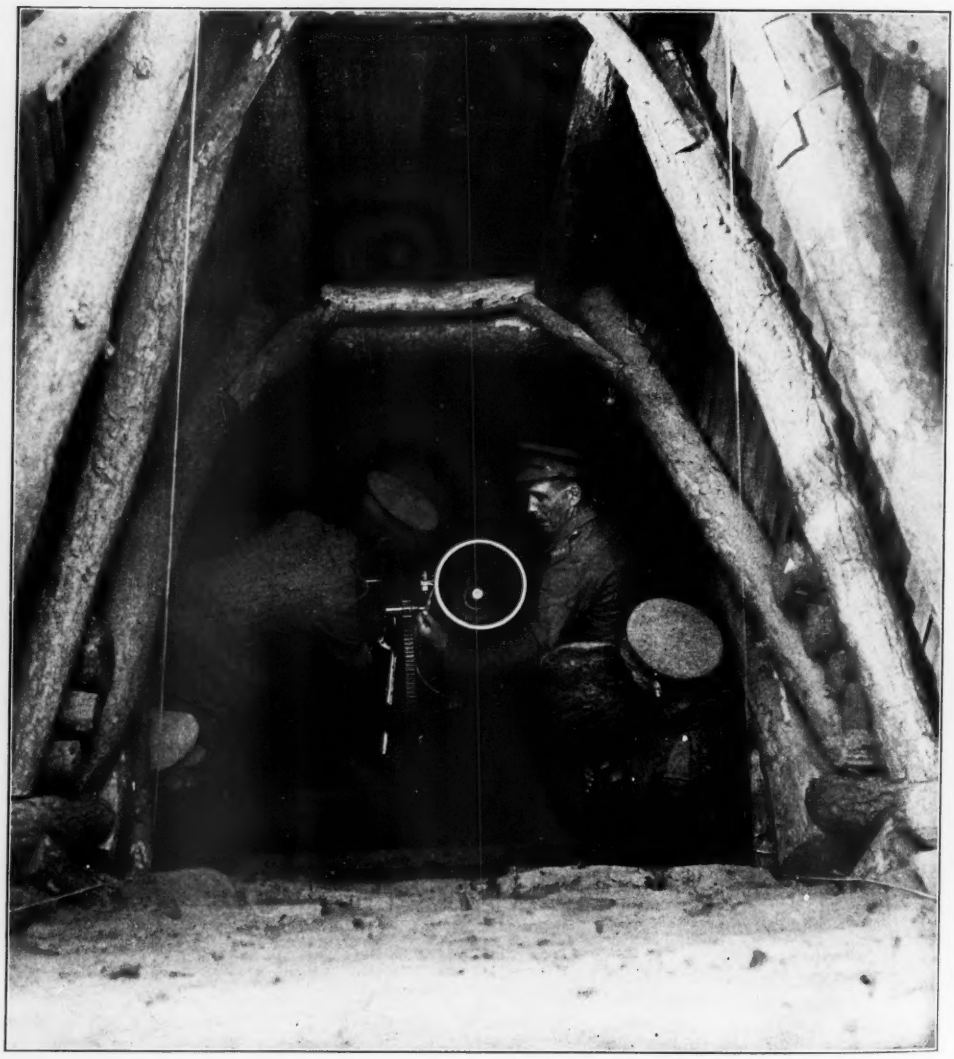
A comparison of the transportation (page 612) and medical maps (page 616) will show a Decauville line from the village where the field hospital is to the evacuation hospital at railhead. The car has room for four stretchers hung on springs to soften the jars

A FIELD HOSPITAL

In a temporary building behind the battle front (see map page 616), where the seriously wounded are cared for until they can be sent back to the base hospitals



CONSTRUCTION OF PIT FOR TRENCH MORTAR OR BOMB THROWER

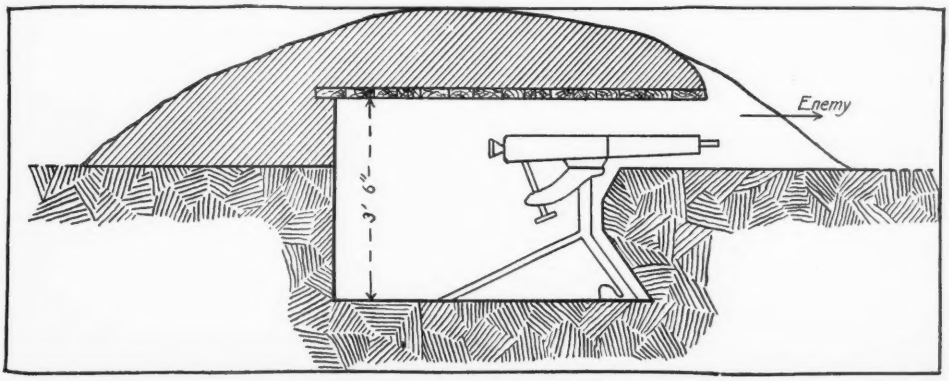


A TRENCH MORTAR WITH SHELL READY TO FIRE

Mortars are placed in various parts of the trench systems anywhere from 50 to 300 yards behind the first line (see diagram on page 621) and their high explosive shells are useful in demolishing enemy trenches

A MACHINE-GUN POSITION IN THE OPEN

Where the guns and men are protected only by small dugouts and shell craters—conditions which obtain during an advance

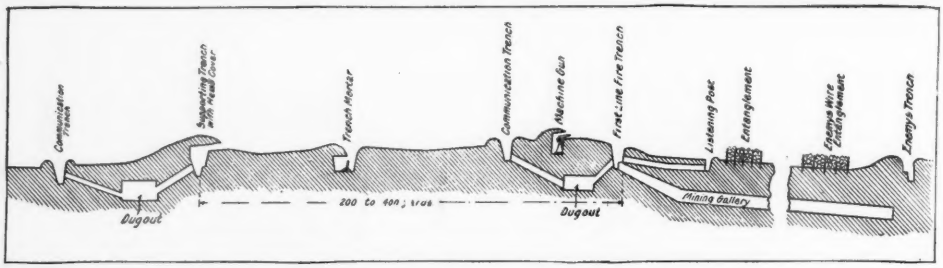


A MACHINE-GUN PIT WITH OVERHEAD COVER

The position of these pits is shown in diagram on page 621. They are concealed from the enemy and arranged so as not to fire straight in front but diagonally, in order to have more of the enemy in range

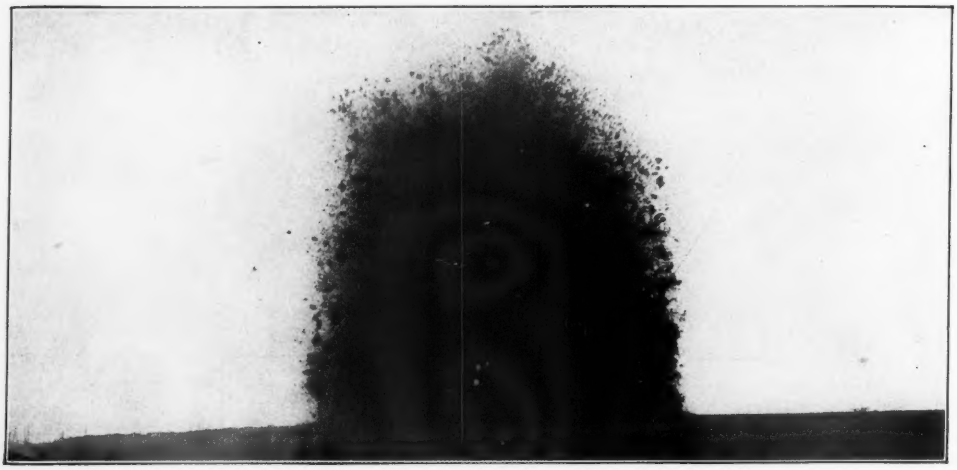
A HIDDEN AND DEFENDED MACHINE GUN

Which fires through the painted net curtain. Except for the noise, which resembles a pneumatic riveting machine, it gives no indication of its whereabouts to the enemy



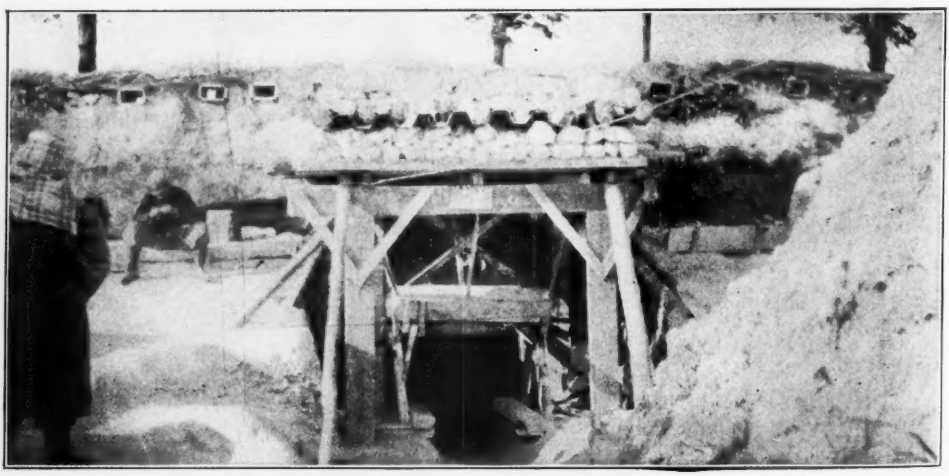
A SECTION OF FIRST-LINE AND SUPPORTING TRENCHES

A detail of such a position as the one shown on the map on page 604 and on the diagram on page 621, giving a conception of the obstacles an enemy must pass in carrying such a position



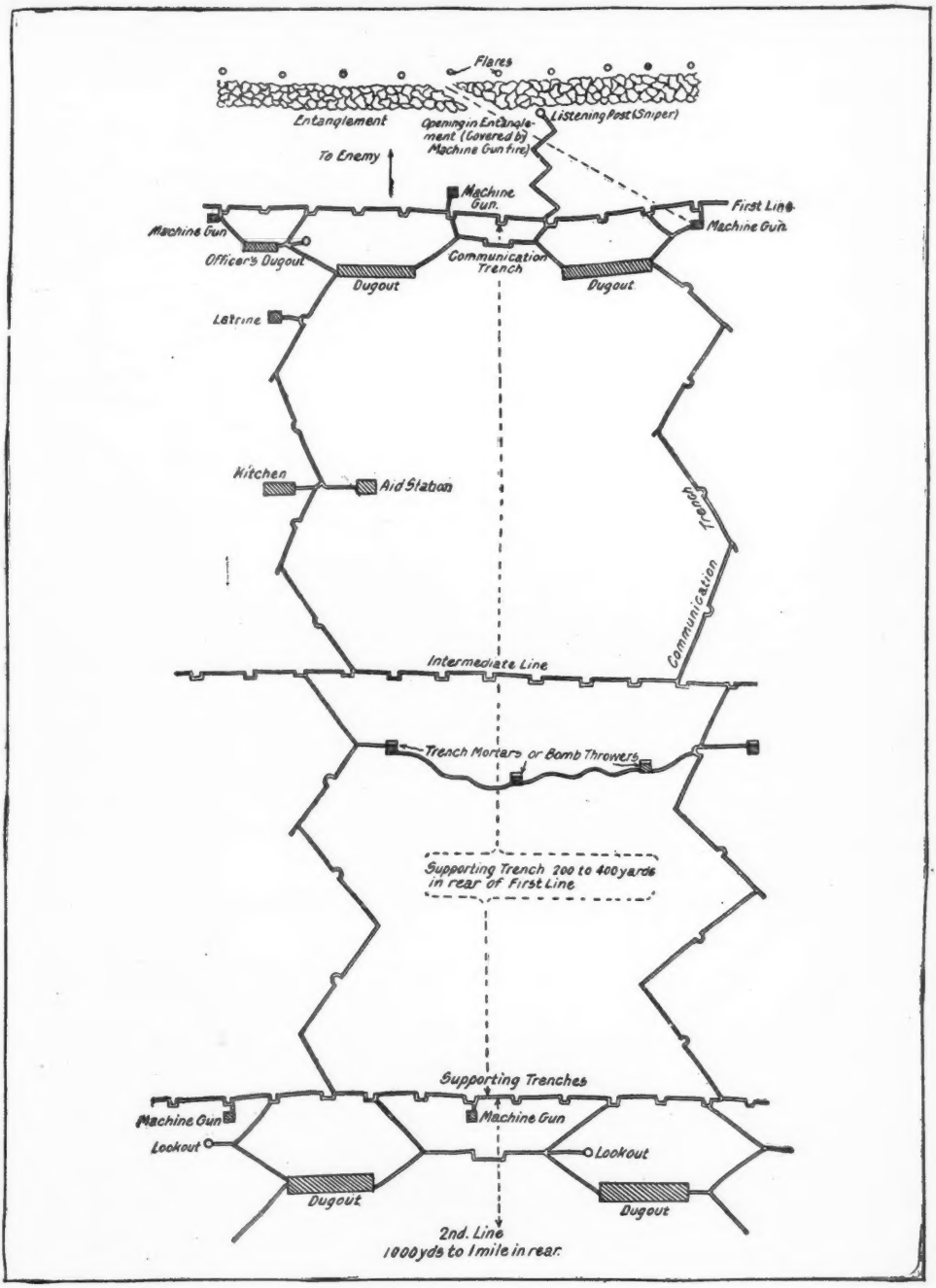
A MINE EXPLOSION

In one case in the present war six of these were set off alongside one another in one system of trenches



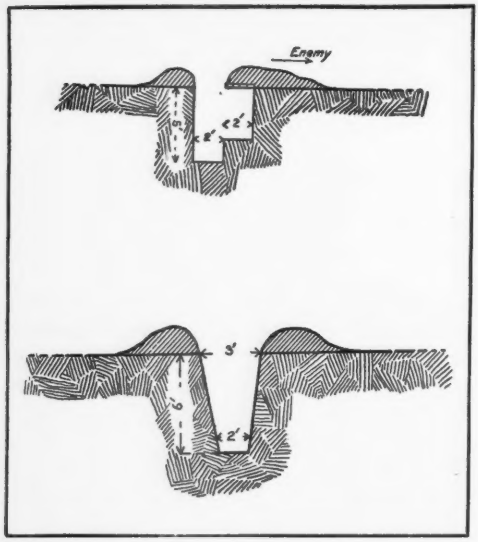
THE ENTRANCE TO A MINE GALLERY

This particular tunnel was 300 feet long and a light railway took away the dirt



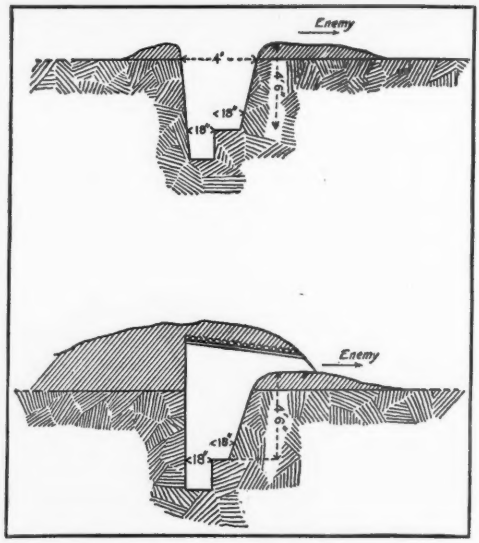
PLAN OF THE ORGANIZATION OF ABOUT 100 YARDS OF TRENCH

This small part of the front has caused the digging of three or four miles of trenches of all kinds, dugouts, mortar and machine-gun pits, and has to be equipped with telephone systems, aid stations, kitchens, and sanitary arrangements. This diagram shows something of the work entailed in organizing a position in modern trench warfare



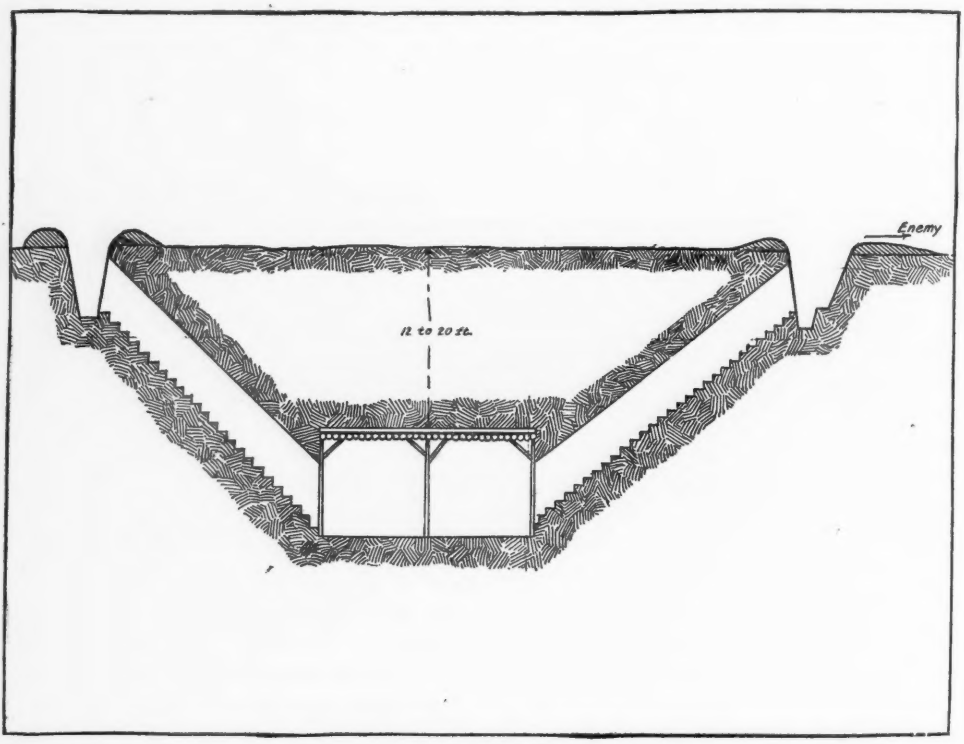
COVER AND COMMUNICATING TRENCHES

Cover trenches (above) used by men not firing. Communicating trenches connect the front line with the rear. Both are zigzagged, so no long section can be swept by enemy fire. (See page 621.)



FIRE TRENCHES

Unsheltered (above), showing the shelf on which the men stand to fire and the thick dirt parapet toward the enemy, and (below) a trench with a shelter against shrapnel, hand grenades, etc.



A FRONT-LINE DUGOUT

With the usual two outlets to prevent bombardment from burying the occupants alive. This is a simple dugout. Many are much larger and more elaborate

IF GERMANY SHOULD WIN

THE EFFECT UPON THE UNITED STATES IF THE SUBMARINE CAMPAIGN AGAINST ENGLAND SHOULD SUCCEED

BY

EDWARD G. LOWRY

HAVE you ever let yourself consider for a moment what would be the effect on the world, on this country, on yourself, if the Germans effectively blockaded Great Britain with their submarines and starved it into submission? It would rank with the most stupendous calamities that ever befell this troubled world. Not a man living but would feel the effect of it in one way or another. The very threat to attempt to enforce a blockade by committing murder at sight is a challenge to civilization and to the continued existence of organized society on this planet. If by any remote chance the Germans should prove successful there would be no peace and security in the world until the political ideas that dominate Germany were exterminated.

Put it to yourself this way: Suppose a man in your town said, "Whoever walks down Main Street, man, woman, or child, and upon whatever errand or mission, I will kill secretly and without warning." Suppose in carrying out this threat he planted dynamite under the sidewalks and concealed thugs with shotguns on roofs, behind chimneys, and in the upper stories of buildings in order to make his threat good. Would not that disorganize life in your home town? Would you endure it?

That is precisely what Germany is doing on the high seas to-day, and if she could succeed she would destroy the whole fabric of human society, intercourse, communication, and relations between peoples. Consider for a moment what effect her mere threat has already had upon the United States. Items: First, a newspaper dispatch from Boston dated February 19th: "Acting upon instructions received from Washington, Postmaster Murray announced to-day that he had suspended the making up and dispatch of mails, both regular and parcel post, for Great Britain. This action was taken, it was said, because of the present uncertainty of steamship schedules." The Postmaster General, a member of the Cabinet, issues weekly an official leaflet giving detailed information about the transmission of mails. The issue of February 24th contains this postal information about transatlantic parcel-post mails:

Great Britain and Ireland—Sailings uncertain.
France—Sailings uncertain.
Belgium and Netherlands—Service suspended.
Germany, Austria, and Hungary—Service suspended.
Liberia—No sailing at present.
Greece—No sailing at present.
Gibraltar—Sailings uncertain.
Denmark—Sailings uncertain.
Sweden—Sailings uncertain.
Norway—Sailings uncertain.
Italy—Sailings uncertain.

The American Line steamship *St. Louis* was at New York preparing to sail when the German threat to murder at sight on the high seas was made. She had somewhere between 3,000 and 5,000 bags of mail on board consigned to Europe. The American line has been subsidized for years by the Federal Government as a mail carrier against just such an emergency. But the *St. Louis* did not sail. She turned over her mail bags to a British steamer, the *Cedric*. The *St. Louis* then lay in port, where she was joined by the steamships *Philadelphia, St. Paul, New York*, and *Kroonland* of the American Line. All these ships were lying in New York idle and terrorized by the Germans on February 24th. The president of the

line told the newspapers that the detention of the ships was costing his company $100,000 a week. That is one little detail. The New York *World* made this pointed and truthful comment: .

What has happened is that the Atlantic ports of the United States are blockaded by Germany, and our ship-owners are afraid to assert their legal rights. Even the American Line ships which carry the United States mail are held in port by order of the German Government.

We are doing precisely what Germany commanded us to do. Our merchant shipping is no longer under the sovereignty of the United States but under the sovereignty of the Imperial German Government. Germany says we must not sail the seas under the penalty of death, and we do not sail the seas. It could hardly make its orders more effective so far as Americans are concerned if its submarines had taken physical possession of our harbors and the regulation of our merchant shipping had been formally turned over to the German Admiralty.

Every day that American ships are afraid to put out to sea because of German defiance of law and civilization, our rights are invaded, our honor is sullied, and our power as a great nation is challenged before the world.

THE TIE-UP OF FREIGHT CARS

That is a truthful and restrained picture of the first faint effect upon us of a mere threat by the Germans to starve England by a policy of murder at sight in the sea. There are others. This report, for example, from the New York *Times* of February 11th:

Cars, cars everywhere, and not a ship to load—this is the literal truth about the freight yards, piers, and tracks in and near the Metropolitan district. The freight yards are literally full of cars, cars loaded to the limit with merchandise awaiting ships. Wherever cars could be hauled and left they were found—waiting until something happens. While steamship men are waiting to see what the German blockade will do, and while railroads are doing everything possible to prevent the arrival of more cars in the city, thousands now remain idle in the yards and on all track space not actually needed for moving trains. The impressive thing about the scene is the almost absolute stillness of everything. Cars and cars and cars—where, under usual circumstances, men would be busily engaged in unloading, engines in switching, and floats in carrying cars across the river—there is no activity at all—everything is dead and motionless.

Our exports last November were valued at $517,900,000—a new high record. The United States entered upon the last month of the year 1916 with a foreign trade of $7,148,000,000 for eleven months and with the prospect that the year's trade would approximate $7,800,000,000 in value.

Practically every citizen of the United States has participated directly or indirectly in this flush of prosperity. Every citizen, directly or indirectly, will feel the effect of its curtailment.

ONE REASON FOR THE FOOD RIOTS

The inability to ship commodities abroad was a contributing element in dislocating the railroad service in the United States and, to that extent, the underlying cause of food riots in some of the big cities in February. A mere unsuccessful threat to starve England had these effects upon us in February. Everybody recalls what happened at the beginning of the war when the sea lanes were closed. Shipping sailings were cancelled then. The stock and commodity exchanges closed. Cotton could not be sold at 4 cents a pound. Wheat was embargoed. Then the sea lanes were opened again and wheat went up from 40 cents to a dollar and a dollar and a half a bushel. Cotton went up. Factories were reopened. Hundreds of thousands of idle men found employment. Wages advanced to new high levels. And why? Simply because the British Navy had reopened the sea lanes and ocean traffic was resumed.

These losses and these humiliations, it must be borne sharply in mind, were brought about by ineffective threats. It staggers the imagination to picture the effects upon the world if German submarines effectively should starve Great Britain. She would have to give up her fleet. The British Empire is based upon sea power. Sea power is based upon ownership of a great fleet, and therefore the British Empire would disintegrate. Canada, Australia, Egypt, India, would be

detached. And if Germany got the British fleet, what would we get?

Not invasion, for that would not be necessary. We would have to fight for the Monroe Doctrine with every ounce of our energy and power and all our resources. We would have to fight to prevent dictation of commercial terms. Even the grandiose German dream, for some of them have had it, of imposing an indemnity upon the United States to pay for the cost of the war might be faced in terms of actuality. Germany has never assented to the Monroe Doctrine, and she has sought more than once to impair it and break it down. Any one familiar with our foreign relations knows this. She has made attempts in Haiti and in Venezuela, to gain a permanent foothold. She has a great colonization project in Brazil. She looks to establish herself in South America. The stories of these attempts are familiar. Some of them were told in the March number of the WORLD'S WORK. It is needless to go into them at this time. A student of foreign affairs at Washington used this striking figure the other day, "Uncle Sam for the last fifty years has had the greatest navy in the world to maintain the Monroe Doctrine, but the greater part of it was in his mother's name." Is it necessary to explain that he had the British Navy in mind?

THE BRITISH FLEET AND HUMAN DESTINY

Consider this dramatic fact: There are between twenty-five and forty fighting ships, with their auxiliaries, flying the British flag, now lying at naval bases along the North Sea coast of Great Britain, that control the food supplies of millions, the rate of exchange all over the world, the political destinies of hundreds of millions, and the growth or decay of democracy on this planet. If by hook or crook the Germans could destroy the British heavy battleship fleet in a night the whole direction and destiny of humanity would be changed. The downfall of the Roman Empire was a momentous event in the history of the world, but it was gradual. Society had opportunity to accommodate itself to its changes. But the fate of this world as it is organized to-day hangs on that little group of engines of war off the north coast of Scotland and the men who control it. They mean more to us and to posterity than any one quite realizes. Verdun and the Berlin-Bagdad ideas, great conceptions as they are, dwarf into trivialities. Should this little group of floating gun platforms fail in its appointed task, we would feel the effects, next to Great Britain, more than any country or people in the world. It would mean that England would be starved into submission. It would mean that we would probably lose all the money that we have lent to England and all that she owes us. It would mean a financial panic such as the world has never seen. Credit would dry up. Exchange would break down. All the fabric of international commerce would be destroyed. All the relationships that have been established between nation and nation and people and people would have to be reconstructed on a new basis. It would mean nothing less than the reconstruction of the civilization of the whole world. Every trade route, every financial arrangement, every political agreement, and every international policy would have to be modified and shaped to meet the new and unreliable conditions. No finite vision can comprehend in definite, actual terms the extent and full effect of such a calamity. It is worth thinking about and worth speculating about here in the United States, remote as is the possibility, if it brings home to the people here how closely our destinies in the world are linked with Great Britain's. The two countries are indissolubly bound together in this world. Their fortunes cannot be separated. They must fail or prosper, rise or fall, together. Neither can go ahead at the expense of the other. Every day since this war began has proved that. If the United States had not supplied Great Britain and her allies from our financial, industrial, economic, and agricultural resources the war against Germany could not have been waged as it has been. If Great Britain, through the employment of her sea power, her fleet, had not kept the sea lanes open, the condition of stagnation that came at

the outbreak of the war would have prevailed, only to a lesser degree, to-day. We should have had no market for our produce and we should have suffered. We would have been isolated. Our activities would have withered. Factories would have been closed. Hundreds of thousands of idle men would clamor for employment. You can draw the black picture for yourself of what would happen if this country's activities were arrested and crippled.

GERMANY'S LAST CARD

Murderous attack on sea traffic is not to be thought of merely as an academic problem or as an attempt to blockade England. When the Germans declared that, throwing aside all considerations of conscience and the sense of duty imposed by the principles of humanity, they would begin a ruthless killing campaign at sea, they in effect declared war against the United States. No "overt act" was needed to make the declaration complete. After the sinking of the *Lusitania*, the *Arabic*, and the *Sussex*, Germany gave promises and pledges to respect the rights of neutrals at sea. Now it has determined not to keep those promises. It staked its future and its right to be considered as a community of civilized human beings on the success of its submarine campaign. Like a wild beast at bay, it is making barbarous warfare. If it loses, it becomes a pariah in the civilized world and should be ostracized by the civilized nations. It is Germany's last throw of the dice. The nation is playing for a great stake.

The submarine is the veto power of the sea. It is purely obstructive and destructive. It contributes nothing to wealth or civilization. It is in a class apart from other craft. The other forms of water craft can be used and are used to make the world a better place to live in. They convey merchandise and passengers. They serve as a means of communication between nations and peoples. The submarine is a mere killer. It cannot even fight. It must kill furtively and secretly, like an assassin.

The Germans have staked their place in the world upon their belief that this weapon, sufficiently multiplied, can disorganize and destroy sea traffic. If they are right, sea power, as it is understood to-day, will become a thing of the past. There can be no mastery of the sea. If submarines can be so used as to starve England, then England loses her supremacy in the world and becomes a fifth-rate Power. If Germany's ruthless submarine blockade can prevent merchant ships from moving from one country to another, then no country is immune from isolation. Submarines cannot fight submarines. If submarines can prevent food from reaching England, no matter how many thousand of them Great Britain may build, it cannot protect food ships against belligerent submarines. The alternatives would be submarine merchantmen or a revision of the international code governing the rights of ships at sea.

Mr. Lansing recently submitted to the American Institute of International Law a proposed revision of the international code which would exempt private property at sea, whether belligerent or neutral, from capture, except in the case of contraband. And if the submarine should prove an effective blockading weapon some such code would have to be accepted. At the Hague Conference of 1907, Mr. Joseph H. Choate made a long argument for the immunity of all private property at sea except contraband, but he had to admit that "the United States has never been able to put this policy into practical operation."

GERMAN DECLARATIONS AT THE HAGUE

The whole tendency of modern warfare had been toward a reduction both of its terrors and its inconveniences to neutrals and non-combatants, until the Germans began showing the world what "ruthless" warfare meant. It was at this Hague Conference that the German naval delegate expressed his abhorrence of the infamous practice of strewing mines in the open sea. He gave these pious assurances: "Conscience, common sense, and the sense of duty imposed by the principles of humanity will be the safest guide for the sailor's behavior and will constitute the most effective guarantee against abuse.

The officers of the German Navy, let me publicly affirm, will always fulfil in the strictest manner the duties which proceed from the enlightened will of humanity and civilization." The war had hardly begun before the Germans began strewing mines on all the main traveled sea lanes to which they had access, without regard to neutrals or belligerents. It was pointed out at that time by the British Admiralty that "mine laying under a neutral flag and reconnaissance conducted by trawlers, hospital ships, and neutral vessels are the ordinary features of German naval warfare."

The United States has lost about 30,000 tons of its shipping from German mines and submarines since this war began, and the European neutrals about 990,000 tons. These ships have been destroyed going to and fro on the face of the waters on their ordinary business and at places where they had a perfect right to be.

FOR A GREAT AMERICAN AWAKENING

It may be that this effort and attempt on the part of the Germans to sink every ship approaching Great Britain and to murder without warning every man, woman, or child aboard such ships will serve to make clear to all that vast body of the people living between the Appalachians and the Rockies what the Allies mean when they say they are fighting our battles. A little while ago I made a zigzag journey across this continent, covering most of the populous states, and I found everywhere people puzzled and curious about this protestation so frequently made by the French and the British. Everywhere I was asked, "What do they mean when they say they are fighting our battles? What stake have we got in this war? We are sympathetic with the Allies and we abhor the stories of German atrocities in Belgium and France that we have heard. But why should they say that this is as much our war as theirs?" The events of the month of February ought to answer these questions to the satisfaction of even the dullest intelligence. On Saturday, February 24th, reports came that the Germans had torpedoed without warning in the British Channel seven Dutch merchant ships with capacities aggregating nearly 33,000 tons. Some of these ships were bound from one Dutch port to another; others were bringing food from abroad for the Dutch people and consigned to the Dutch Government. They were not in any way assisting any of the nations now at war with Germany. They were engaged in the purely legitimate and commercial pursuit of bringing food to the Dutch. The Dutch are neutrals; they have suffered much from this war. These seven ships were approaching their home ports in Holland under the assumption that assurances they had received from the German Government that the ships would not be disturbed would be fulfilled. The *Dutch Gazette* said by way of comment:

> It is doubtful whether the Foreign Minister ever had to face greater danger than now. Dutch ships must sail the seas. Otherwise stagnation and ruin will result. Germany is definitely committed that our ships shall not sail or only at prohibitive cost.

The German Legation at The Hague issued a statement saying that the torpedoing of these seven Dutch merchantmen was due "to an extremely regrettable coincidence of circumstances which is unfortunate, but was beyond our control."

But for the accident of geography these seven peaceful Dutch ships might have been American ships. Some of those torpedoed ships were loaded with foodstuffs for cattle. The loss of this fodder, the dispatches say, meant that the Dutch had to kill a large number of Holland's cattle. That we do not suffer as acutely as the Dutch is not due to any fault or lack of desire on the part of Germany. She would cripple us as effectively as she has the smaller neutral states if she could.

OUR DESTINY IF GERMANY WINS

The United States has more at stake in the present situation than England had when she went into the war, with France and Russia, in defense of Belgium. France and Russia and Great Britain are acutely conscious of our stake in the war. So is Germany. If the people of the United States do not see it and do not act up to their responsibilities, we shall have in the

the American Federation of Labor, Howard E. Coffin, vice-president of the Hudson Motor Company, Julius Rosenwald, president of Sears, Roebuck & Company, Bernard M. Baruch, Dr. Franklin Martin, and Dr. Hollis Godfrey, president of the Drexel Institute. The duties of this Council and Commission are best defined by President Wilson:

The Council of National Defense has been created because the Congress has realized that the country is best prepared for war when thoroughly prepared for peace. From an economic point of view there is now very little difference between the machinery required for commercial efficiency and that required for military purposes. In both cases the whole industrial mechanism must be organized in the most effective way. Upon this conception of the national welfare the Council is organized, in the words of the act, for "the creation of relations which will render possible in time of need the immediate concentration and utilization of the resources of the Nation." The organization of the Council likewise opens up a new and direct channel of communication and coöperation between business and scientific men and all departments of the Government, and it is hoped that it will, in addition, become a rallying point for civic bodies working for the national defense.

The Council's chief functions are: The coördination of all forms of transportation and the development of means of transportation to meet the military, industrial, and commercial needs of the Nation; the extension of the industrial mobilization work of the Committee on Industrial Preparedness of the Naval Consulting Board. Complete information as to our present manufacturing and producing facilities adaptable to many-sided uses of modern warfare will be procured, analyzed, and made use of.

One of the objects of the Council will be to inform American manufacturers as to the part they can and must play in national emergency. It is empowered to establish at once and maintain through subordinate bodies of specially qualified persons an auxiliary organization composed of men of the best creative and administrative capacity, capable of mobilizing to the utmost the resources of the country.

The idea of a Council of National Defense grew out of the work of the Naval Consulting Board, a body of civilians with Mr. Thomas A. Edison at its head, appointed by Secretary Daniels to assist the Navy Department in solving its problems. The Council has set to work with commendable vision and thoroughness to lay a broad and real foundation for its work. It has realized from the beginning the immensity of its job and has taken it seriously. Toward the end of January and during the period of "low visibility" after the break with Germany, daily sessions were held, and the foremost men in finance, science, manufacturing, and other lines of endeavor who might be supposed to have knowledge of the industrial and economic resources of the Nation came to Washington to tell what they knew.

PROBLEMS FOR THE ADVISORY COMMISSION

The Council and Advisory Commission established offices in Washington and put a staff of experts to work, with Mr. W. S. Gifford, of the American Telegraph & Telephone Company, in charge as director. This list of committees of the Advisory Commission will give some indication of the lines on which its inquiries are being directed:

Medicine, including general sanitation;
Labor, including conservation of health and welfare of workers;
Transportation and communication;
Science and research, including engineering and education;
Raw materials, minerals, and metals;
Munitions manufacturing, including standardization and industrial relations;
Supplies, including food, clothing, etc.

Here is one of the problems set by the Advisory Commission which is now being worked out:

The Advisory Commission suggests to the Council of National Defense that it is necessary for the further progress of its work that detailed lists of materials with specifications and detailed-dimensioned blue prints, where such exist, be immediately furnished the Commission covering all equipment needs for a million men, assuming that this force is a balanced force, and for the assumed force of the Navy and Marine Corps with its numbers increased to emergency strength.

We also desire estimates of reasonable accuracy covering the maintenance of a force of the size mentioned above in the field during each ninety days of active service.

This information is requested in order that approximations may be made as to amounts of material both manufactured and raw for which it will be necessary to draw upon the resources of the country.

We shall appreciate it if the Council of National Defense will transmit this request to all bureaus and divisions which may be able to supply such information, and then send this information to the Director of the Council for transmission to the different committees.

It is doubtful in the extreme whether any officer or official of the War Department or the Navy Department is competent to furnish accurate information or even reasonably accurate estimates in response to this inquiry. Our two military Departments have not had any experience in planning for supplies and equipment for the maintenance of a million men. It is not only doubtful whether they would know how much such a force would need, but it is certain they would not know where to procure the necessary supplies and equipment of all sorts. The response to this request will be valuable as showing just what capacity for enlargement exists in the present organization of the Army and the Navy.

MR. WILLARD AND THE RAILROAD PROBLEM

Another thing that has been done is to request the Chamber of Commerce of the United States to have a small committee appointed in each of the cities in which the Quartermaster's Department of the Army has headquarters, to advise and assist local quartermasters, in case it may become necessary, upon short notice, to make purchases in unusually large quantities. President Daniel Willard, of the Baltimore & Ohio Railroad, who is virtually giving up all his time to this volunteer work of the Advisory Commission, is making a survey of all the transportation systems of the United States. He seeks to discover the quantity and character of all railroad equipment, the strength of all the railroad bridges, where all the heavy grades are on the main line railroads, so that after all the information is collected it will be possible to say with certainty how many troops can be moved and what quantity of supplies can be moved, at what speed, and by what routes. The problem will be solved in practical terms. For example, how many engines, how many cars, how many trains, and how many days will be required to move 12,000 men from Memphis to Plattsburg, or from Chicago to Fortress Monroe, or from New Orleans to Baltimore, or from Atlanta to Portland, Ore. When the troops and supplies have been moved, how will the empty cars be disposed? By what routes will they be distributed? The plan is to make the railroads not only a national resource but an organized national resource. Thus, on March 1st, seventeen railroad executives, including the presidents of many of the largest lines, met in Washington to discuss plans by which their roads could be dovetailed into the workings of the four military districts of the United States. On the same date, officers of four of the largest interests in electric railways met with the general committee of the Council, the Secretary of War, and the Chief of the Army War College to work out a correlation of electric railway transportation with the broad work of the Council.

The Council of National Defense faces two main lines of procedure. It may first evolve and lay down a national policy of preparedness and then seek to discover the personnel, the material, and the economic and industrial resources to put that policy into effect and to maintain it. Or it may make a survey and investigation to discover what are the economic and industrial resources of the United States as a basis for a policy of defense. An intelligent policy of national defense must be based on an adequate knowledge of resources organized for effective use.

NITRATES AND AMMUNITION

Take the concrete problem of nitrates. Congress has appropriated $20,000,000 to erect a nitrate plant. Everything necessary to produce powder in abundance exists within our continental borders except nitrate salts. At present these are indispensable, and the sole source is the Chilean output. The fixation of atmospheric nitrogen or its adequate production by any practical manufacturing method has not yet been done in this country. It can and probably will be done, but that

requires time, and a great deal of time. Meanwhile, it seems a public duty to secure and store nitrate of soda in ample quantity to meet our ammunition needs for at least a year or two of continuous war. It does not deteriorate in storage, and if not needed for powder its commercial use is assured. The powder output is easily increased, as illustrated by the experiences of the Du Pont Company. The capacity of that company up to October, 1914, was not more than 10,000,000 pounds per annum. By January, 1915, the output reached 950,000 pounds per month; by April, 3,000,000 per month; by January, 1916, 20,000,000 per month; and its present production is probably 30,000,000 pounds per month, or more. In addition to powder, this company is turning out very large quantities of gun-cotton.

THE COMPLEXITY OF RIFLE MANUFACTURE

Or again, take the manufacture of rifles. A board appointed by the Secretary of War has reported that the Springfield rifle has more than a hundred parts and it requires more than 1,400 distinct factory operations to produce the finished piece. The experience of our most highly organized and best equipped plants in carrying out European orders for military rifles is a lesson that the Council of National Defense has taken to heart. The lack of correct specifications and drawings, followed by the lack of correct gauges, jigs, special fixtures, and tools, not merely caused delay in arriving at a satisfactory output, but caused a large wastage of time and labor upon unsatisfactory products. The plants that are now turning out foreign rifles after two years of hard work have not yet reached their expected capacities. To turn these private plants from the manufacture of European rifles to the manufacture of the Springfield rifle would, if undertaken to-day, require not less than eighteen months to get first results and at least two years to get capacity output.

There are now five plants manufacturing military rifles in this country, but none of them is equipped to manufacture the Springfield rifle, and it would require a completely new set of gauges, jigs, fixtures, and tools to enable any of them to do so. The cost of this new equipment appears to be about 20 per cent. of the total cost of the plant. These private plants are not well located either with respect to safety or convenience. It is questionable just how far arrangements can be advantageously made for educational units in this particular line.

TO TRAIN AN INDUSTRIAL ARMY

The more immediate problem of the Council of National Defense is industrial and economic preparedness as contrasted with military preparedness. In this field the Council has already discovered that in many respects the United States is more advanced than even the most highly organized of the belligerent nations in Europe. It takes about ten or twelve months to turn out a fairly competent trained soldier, but it takes years to train a good toolmaker. We have many more good toolmakers in this country than we have good soldiers. As Mr. Howard E. Coffin wrote last May in the WORLD'S WORK.

> The test [in Europe] has gotten down to which country can fastest and longest supply the munitions of war to the men on the fighting line. It has gotten down not to the point of professional fighting men but to the question of whether every man, woman, and child of the nation has been engaged and is engaged in the production of some kind of materials for the armies at the front. It has even gotten to the point where the women of the leisure class are going into the mills and the factories at Saturday noon and working in seven-hour shifts until midnight of Sunday, in order that the mills may not be closed down during the time that organized labor stops work for its period of rest. When the problem of warfare comes down to this basis, it is no longer a question of the ability of the departmental heads of the Army and Navy, but it is a question of the ability of every bit of industrial brains in this country. . . . Now it is the skilled mechanic of the future who is going to win the wars of this country, because he is the man who is going to produce those munitions in such quantities as will be used by the fighting line, whereas the banker, if you like, and the lawyer is merely a man who carries a gun at the front—as they put it abroad, is cannon fodder."

Sir Douglas Haig, commander-in-chief of the British armies in France, is re-

ported to have said last year: "It takes five first class men behind the lines to keep supplied with his necessities every fighting man in the firing line."

ALL BRITISH TRADES MAKING MUNITIONS

It is the problem of the Council of National Defense to have this great industrial army that will never go to war as thoroughly organized and as completely trained and drilled and in readiness as any regiment of "regulars." That means a great conversion of industry. The time to make this conversion, to plan it, to arrange it, and to test it is before war begins. The experience of England proved that the preparation and supply of munitions and equipment is the most important department of the Government in time of war. When Mr. Lloyd George in England undertook to organize the Ministry of Munitions a glazier began to stamp out cartridge-clips; a manufacturer of music-rolls used his equipment to make gauges; a concern engaged before the war in preparing infants' food began delivering plugs for shells; an advertising agency manufactured shell-adapters; watchmakers began adjusting fuses; a manufacturer of baking machinery became a contractor for six-inch high-explosive shells; a jewelry house devoted itself exclusively to periscopes; a phonograph concern sent millions of delicate shell parts to the assembling stations; a firm which made nothing but sheep-shearing machinery started turning out shell-cases; a cream-separator factory manufactured shell-primers. Among other producers of finished shells were candle-makers, flour mills, tobacco manufacturers, syphon-makers, and the manufacturers of sporting goods. The Government prevailed on a firm making textile machinery to take an order for field kitchens. In an amazingly short time they completed the delivery of what quartermasters described as the finest field kitchens they had ever had. Thus encouraged, the Ministry of Munitions prevailed on the company to begin the manufacture of 4.5 inch shells.

One of the surprises of this war has been the successful employment of women as munition workers. In many of the plants and factories at the lighter work inexperienced women have proved themselves able to turn out a greater quantity of material than skilled men. Mr. Lloyd George has mustered more than 195,000 women into the munitions industry and has had them taught some of the most intricate processes of shell-making. One young dressmaker who volunteered was put at a machine which was supposed, in the hands of a good workman, to turn out thirty shell-parts an hour. This woman's output is now seventy-five an hour. Another expert is a young typist who had five brothers in the army. This girl is now a most expert machinist.

THE "ANNUAL ORDER" PLAN

In Germany before the war many manufacturing plants were required in time of peace to devote a certain period each year to turning out munitions. The experience gained in time of peace enabled these factories to be converted into munition plants immediately and without friction upon the outbreak of war. The Council of National Defense has under consideration putting into effect some such plan in the United States. Take, for example, the manufacturers of cash registers. This industry is well organized. It employs under good factory conditions thousands of skilled men. On the outbreak of war the commercial demand for cash registers might be expected to dwindle away at once to almost nothing. If plans now in the making become effective the cash register companies would be at once converted into munition plants to make whatever part of a shell or a gun or a rifle they were best equipped to make. In preparation for such an eventuality it has been made possible by Congress to give to the cash register manufacturers annual orders for five or ten thousand dollars' worth of the stuff they would be required to make in time of war. Congress has given the War Department $250,000 to be expended in such "annual educational orders."

The automobile manufacturers are in the same posture. The making of automobiles is being standardized. There are one hundred makers of motor cars in the United States. It might be necessary to keep only twenty-five factories at work

turning out automobiles. The others on a prearranged plan could be converted at once into plants for the manufacture of supplies and munitions on which they had had conditional and experimental work in time of peace.

A CENSUS OF OUR INDUSTRIAL FACILITIES

No aspect of the whole problem of the work of the Council is more encouraging than the attitude of private manufacturers toward this whole questionof preparedness. Even before the National Council of Defense was organized, the Committee on Industrial Preparedness of the Naval Consulting Board conducted a nation-wide inquiry to discover: first, what American industry can actually produce in munitions of war; secondly, to apply that knowledge in a practical way which would put plants in this country into the service of the Government behind the Army and Navy; thirdly, to form an organization of skilled labor that will not be called from its job when war comes and that will not allow skilled laborers to go to the front only to be pulled back later from tasks which they should never have begun. In England at one time since this war began, two great volunteer organizations were at work, one seeking to induce men to enlist in the army, the other combing out of the new armies men who never should have enlisted because they were so badly needed in the industries. The Council of National Defense will avoid that situation, at any rate. The net result of the industrial preparedness inquiry now lies in steel files in the offices of the Council of National Defense in the form of more than 27,000 comprehensive statements relating to the business and organization of as many industrial plants. The questionnaire was drafted by experts and divided into questions relating to business administration, full details of plant, manufacture and production, labor, transportation, inventory of manufacturing and producing equipment and, most important of all, concerning possible future arrangements these questions were asked:

Would you consider bidding upon regular U. S. Army and Navy contracts in time of peace?

Would you consider accepting U. S. Army and Navy business in time of war on cost plus reasonable profit basis?

Would you consider accepting "Minimum annual educational order" under this clause?—

Minimum order for annual production of Army and Navy goods will be accepted with the understanding that such order will be restricted to that product for which the manufacturer's equipment is best fitted; also, that such order shall be for only such a quantity of product as will insure familiarity with the work upon the part of the manufacturer's organization. The manufacturer agrees that this minimum annual educational order shall be put through the factory in regular course and in such manner that foremen and those holding positions of responsibility shall become familiar with the peculiarities incident to the manufacture of these goods. In event of war the manufacturer will be expected to concentrate upon this same product, and it is essential, therefore, that his entire organization, including purchasing, manufacturing, inspection, shipping, engineering, cost keeping, and administrative departments be made familiar with the work. Minimum orders will not be of sufficient quantities to interfere with manufacturer's regular production.

Would you consider accepting payment according to this clause?—

It is proposed that payments for "minimum annual orders" shall be made upon the basis of the actual cost of production, inclusive of all special tools, jigs, etc., plus a reasonable profit. In case special jigs, tools, gauges, or fittings are necessary for the production of these goods, a minimum supply shall be kept on hand, and if they can be made in the plant, the engineering or designing department shall maintain at all times corrected drawings from which the shop may, upon short notice, construct the necessary equipment for quantity production.

Would you favor the enrolling of skilled labor according to this clause?—

In war as now waged the industrial force has become quite as important as the fighting army. Skilled mechanics in all lines of production work must be kept from enlistment in the Army and must be retained in the factories, mills, and mines for the production of munitions. It is essential, therefore, that the names of these skilled workmen be listed and that the men themselves be enrolled in the Industrial Reserve. It is proposed that a button or other distinguishing mark will be supplied by the Government in the event of war to skilled workmen enrolled in the Industrial Reserve, and such enrolment will be considered to carry with it honors equal to enrolment in the fighting army. It is also proposed that a Government card will be issued to each man enlisted.

II. PLANT

1 (a) Location of plant..... (City or Town) ..... (State)

..... (Street and number—Bound by streets to determine location on city map)

.....

(b) number of buildings..... (c) are buildings owned or rented.....

2 Plant surroundings..... (Isolated position, congested district, etc.)

3 Population of city.....4 City map attached?.....5 Blue-prints attached (a) ground plan with building locations?.....(b) floor plans?.....

6 Total ground area..... (Square feet) 7 Ground area unoccupied available for expansion..... (Square feet)

8 Building construction..... (Concrete, brick, wood, etc.) 9 Number of stories.....10 Insurance rate.....

11 Floor space..... (Square feet) 12 Approx. carrying capacity of floors per sq. ft..... (Pounds)

13 (a) Can stories be added?....(b) how many....14 Company offices in plant or separate.....

15 Description of fire protection.....

.....

.....16 Sprinkler system, ... (Kind)

17 (a) Heat—developed in plant?.....purchased?.....

(b) Light—developed in plant.....purchased ..... (Kind)

(c) Water supply..... (Private or outside sources)

18 (a) Power developed in plant..... (Kind) purchased..... (Kind)

(b) power now operating..... (Horsepower) (c) maximum capacity..... (Horsepower)

19 Can plant be operated at night?.....

20 Elevators—(a) number of freight .....(b) capacity of largest.....

(c) platform of largest, length ..... (Feet) width..... (Feet)

21 (a) Are facilities ample for feeding employees?.....(b) if large addition made to force?.....

22 (a) Are facilities ample for housing employees?.....(b) if large addition made to force?.....

23 Wash rooms?.....24 Lockers for employees?.....

25 (a) Postal or Western Union office in plant?.....(b) number of telegraph operators.....

(c) how many are not American citizens.....

26 (a) Telephone switchboard in plant?.....(b) number of telephone operators.....

(c) how many are not American citizens.....

(d) number of departmental extensions.....(e) number of trunk lines to outside.....

27 Auto call or other signalling system in plant?.....28 Pneumatic tubes between departments?.....

A PAGE FROM THE QUESTIONNAIRE

More than 27,000 industrial concerns have answered these and other questions, and the information thus secured has been filed confidentially in the offices of the Council of National Defense

All the information received in response to this nation-wide inquiry is now being tabulated and analyzed. Only a few of the manufacturers have doubted the ability of their plants to aid the Government in war time, and even these have changed their views when shown how little doubt there is that on the outbreak of the war virtually all concerns not engaged in lines of work essential to the national needs would be stripped of their labor, either for the Army or for maintaining other industrial plants vital for the supply of such need. In the event of hostilities probably 80 per cent. of the industries of America would of necessity be mobilized and concentrated on producing the many elements of twentieth century warfare. The war abroad has taught manufacturers here the astonishing adaptability of almost any industry when properly inventoried and organized. A dye factory, for example, may be transformed within a week or ten days into a plant for the production of high explosives. How well this lesson has been learned in the United States is shown in the tenders of service received by the Council of National Defense.

ALL THE INDUSTRIES FALL IN LINE

A large capacity sash chain maker believed he could with little difficulty produce cartridge clips for rifles and machine guns, and a manufacturer of threshing machinery was sure he could make six hundred six-inch shells a day.

A maker of underwear declared he could turn out bandages and other knit goods for the Army and Navy and Red Cross services. A button maker thought his machines could be used for small munitions work, and a company manufacturing drugs stated that it could turn a considerable portion of its product into an adjunct for making cordite for shells.

One well-known foundry said it was well equipped to turn out tools and machinery for small arms and ammunition. A maker of belting suggested that he could produce webbing with which to fasten equipment on soldiers.

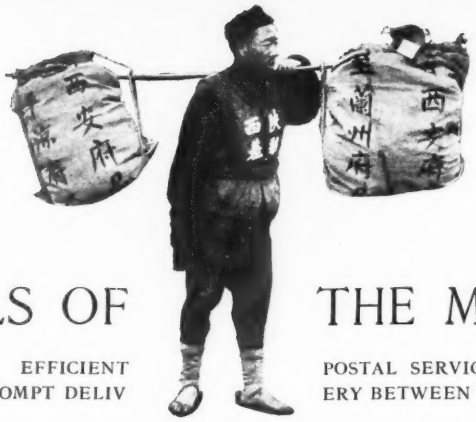
A Buffalo manufacturer wrote: "We look upon it as a patriotic duty to fill out the blank forwarded to us"; and a maker of pocket-knives volunteered to produce various lines of munitions supplies.

Automobile manufacturers have offered every assistance in their power. Several optical makers have pointed out where they could be of practical aid to armies in the field. An extensive tailoring concern emphasized that the production of uniforms should be standardized. One of the world's leading makers of printing presses placed himself wholly at the command of the Council, and a great municipal transportation system appointed its chief engineer to serve the Council's purpose. A leading American manufacturer of farm materials offered to find out what military utilization could be made of his plants in a day of need.

One concern, with its firm members bearing German names, wrote: "We would be delighted, as American citizens, to do whatever we can do to take part in any industrial preparedness which may be planned:" A printing establishment offered the services of its finely equipped map department, and a linotype company stated that it had a large quantity of lathes, drills, milling machines, and other tools adapted for the production of shells, fuses, accurate machine tools, and small metal parts of any kind requiring extreme precision.

These examples might be multiplied many times. Mr. Thomas A. Edison's comment on this piece of work which will form the basis for the programme of industrial preparedness of the Council of National Defense is this:

> With this accomplishment comes not merely a better understanding between the business men of America and their Government, but it marks almost dramatically the entrance of the trained, non-partisan engineer, doing his job on the sole basis of efficiency, integrity, and Americanism, into the affairs of the Government.
>
> But the greatest service which the committee has rendered to our people and Government has been to drive home the vital, irresistible truth that in war, as now waged, battles are won not alone by fighting men but by the fighting industries of a nation.



THE MAILS OF THE MANDARIN

CHINA'S AMAZINGLY EFFICIENT POSTAL SERVICE AND THE METHODS USED TO INSURE PROMPT DELIVERY BETWEEN REMOTE POINTS

IN China the National Post Office delivers mail twelve times a day in some of the larger cities, shows a yearly surplus of receipts over expenditures, and in other ways illustrates a capacity for governmental administration that is a hopeful augury for the future of the newest Republic. The following photographs tell the story of its difficulties and achievements.

TRANSPORTING THE MAILS BY CABLE

China now belongs to the Postal Union and has a most efficient service at very low rates. Though much of the credit for this belongs to foreigners who built up the system, yet without the progressive attitude of the Government and the hard work of the thousands of Chinese employees the service would be a failure

PRIMITIVE POSTAL VANS IN YUNNAN

Roads in China are deplorably bad and transportation inland is practically done by carriers, mounted or afoot, but whenever possible rude native carts are employed

WINGED MERCURIES OF THE MAILS

More daily deliveries of mail have been instituted in China than is customary in many countries. In some of the cities there are twelve deliveries daily. Special delivery letters are despatched by couriers on bicycles

ACROSS RIVERS ON INFLATED HIDES

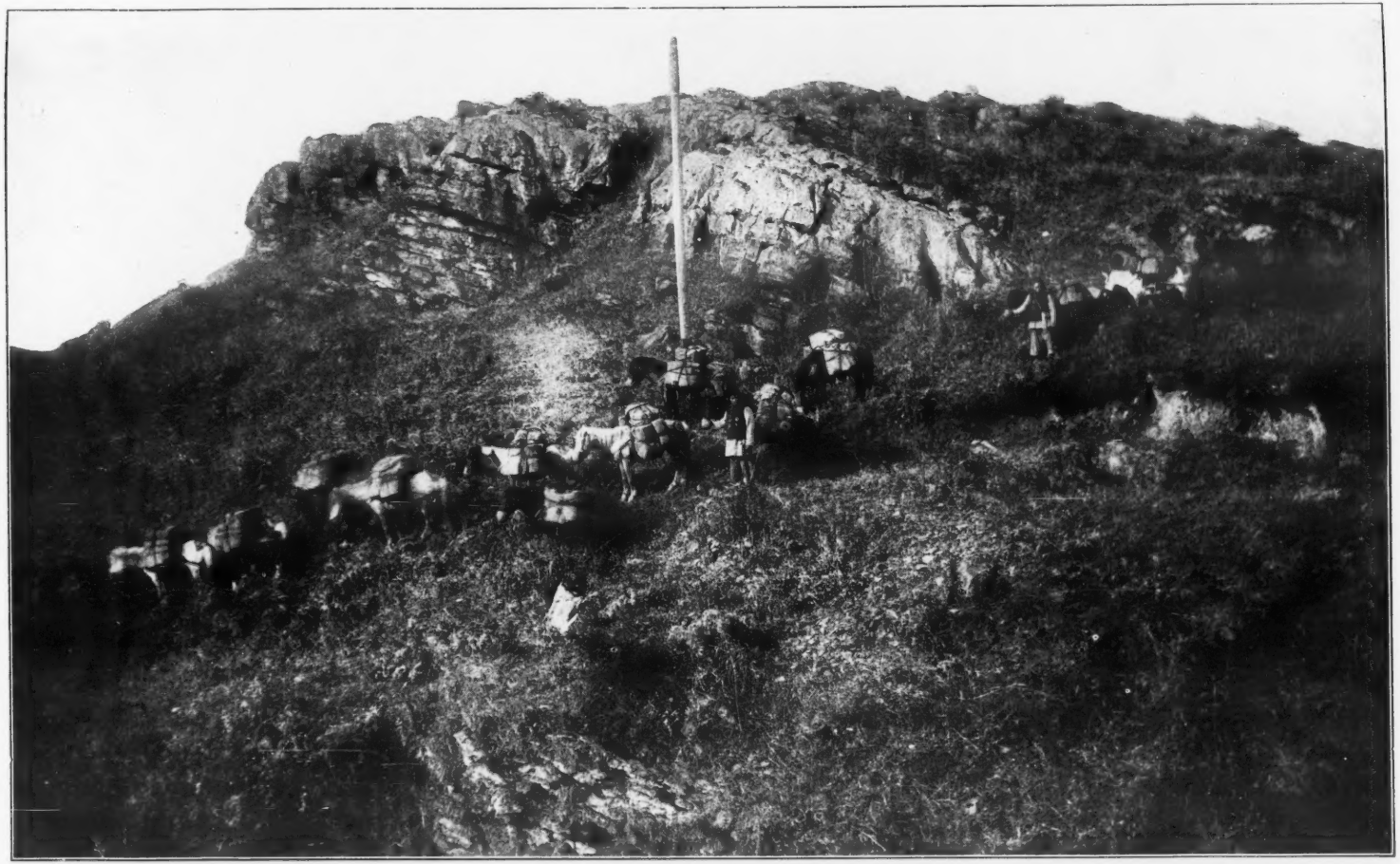
Although means of communication in the Orient are in an undeveloped state, postal rates are very low and the Post Office imposes perhaps smaller fees for the transmission of mails than does any other country

A POSTAL SAMPAN

Notwithstanding the low transmission rates, the Post Office last year paid all its own expenses and showed a surplus of receipts over expenditures

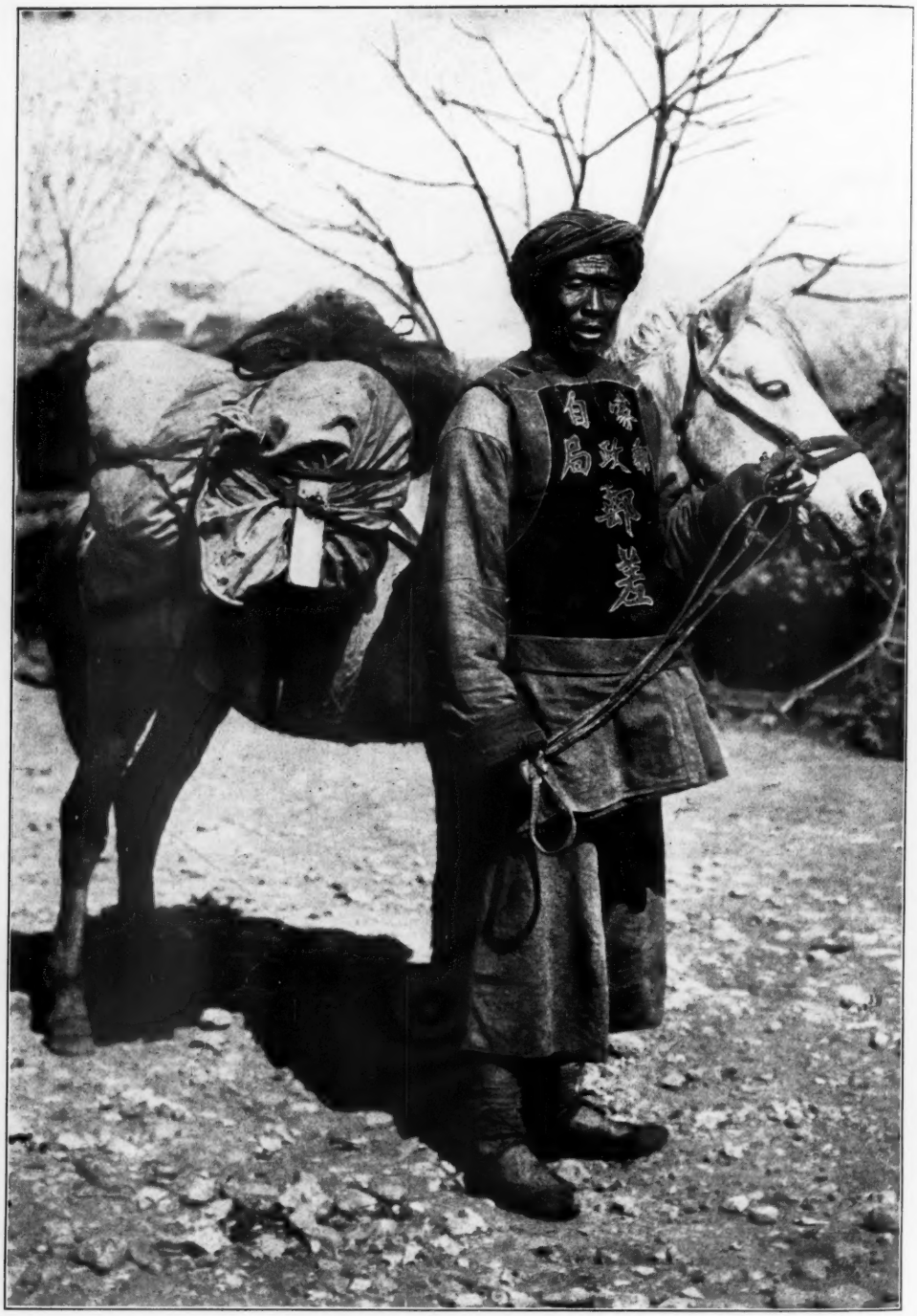
A COURIER PRESENTING HIS PASSPORTS AT A CITY GATE

The Post Office was able to render invaluable service to the country during the period of revolution by maintaining a sort of semi-neutrality toward all parties



THE WINDING PACK TRAIN

While the control of the Post Office is centred in Peking there is also a controlling office in the capital of each province. Here are stationed foreigners who have charge of the offices within their jurisdiction



A MOUNTED COURIER

Several thousands of fast couriers are maintained in the interior. The courier leads a dangerous life, braving floods, exposure, pestilence, and highwaymen

A WHEELBARROW MAIL ROUTE

This slow method is used only in parts of the country where no roads exist, often necessitating that narrow paths between the fields be used

A CAMEL MAIL CARAVAN IN MONGOLIA

In ten years the number of postal establishments in China increased from 1,626 to 8,511 and the money-order transactions from $1,230,000 to $27,000,000

A MAIL CART IN TURKESTAN

On the longest courier line in the world. It traverses deserts and crosses mountain ranges for a total distance of 3,643 miles

HOW CAN I SERVE MY COUNTRY?

THE WAY TO OFFER ONE'S SERVICES IN INDUSTRY, IN THE ARMY, AND IN THE NAVY

"WHAT can I do in case of war?" That was a common question from February 1st on. Well, what would you do?

Examine yourself. You will probably find that the best thing that you can do is to practise deep breathing and bending exercises until you can touch the floor with the tips of your fingers without bending your knees. See if you can run around the block four times without having an attack of heart failure. Have a competent person look at your feet. The chances are ten to one that you have mistreated them shamefully and would be unable to walk five miles with a forty-pound pack on your back. Do not blame Congress for unpreparedness or the Administration for being "slow to act" if you have a thirty-eight-inch chest and a forty-two-inch waistline. One way to bring about a condition of national preparedness is to prepare yourself for the simplest elemental duties of a citizen and a soldier. Cigarettes before breakfast, an ingrowing toe-nail, and a consequent inability to run one hundred yards are just as reprehensible as a lack of patriotism. There is not much to choose between a man who can fight for his country and won't and a man who wants to fight for his country and can't because he has not taken care of himself. If this country got into a real war with a first-class Power, a million fighting men would have to be trained, drilled, and disciplined as a first move. It is estimated that it would take a minimum of five or six million other persons to maintain this army in the field, furnish it with supplies and munitions, and take care of it when it is sick and wounded. Plum jam, gun oil, rubber boots, sandpaper, tooth powder, pocket handkerchiefs, and tobacco are just about as essential to the modern soldier in the field as cartridges or powder or high-explosive shells. If the United States should have occasion to put a million men in the field there would be enough war work for everybody, women as well as men. And if the United States has occasion to fight its battles with some other country's millions it will have all this "behind-the-line work" to do just the same.

The Council of National Defense has been created by an act of Congress to help tell you what you can do in case of war. It is a nice question whether a master baker is not of more importance to an army than any colonel in it. A skilled mechanic who can perform any of the delicate operations involved in the making of a modern high-power rifle or a big gun is the equivalent of a score of soldiers. Ten months will turn almost any healthy, sound man into a soldier, but three times ten months won't evolve a skilled rifle maker out of a farm hand or dry-goods clerk.

Suppose you are engaged in one of the highly organized industries, a maker of automobiles, of dye-stuffs, of woolen goods, of optical lenses, of metal products. The probabilities are that you would be kept on your job; that if you offer your services to the Government as a fighting man they would be refused. Suppose you are engaged in any branch of the system of communications in this country, telephone or telegraph. The chances are that your whole industry would be taken over at the very outbreak of war and that you would find yourself, if not in Government employ, at least under Government supervision, and in the service of your country precisely to the same degree as the man who went out in khaki with a rifle on his shoulder. Certainly if you were a skilled mechanic, a tool maker, or a man accustomed to the use of machinery, you would not be among the first to be shot by the enemy. Trained and skilled producers are even more indispensable in time of war than in time of peace. The larger the number of men required in the fighting line the heavier the responsibility

that falls upon the producer behind the firing line. Not only must he produce for the civilian population but he must make good the shortage caused by the withdrawal of men from industry to the army. Several million men are employed in this country in connection with transportation on the railroads, steamboats, and trolley lines. The utmost care would be exercised by the Government in disturbing these men or in calling upon them to fight. Transportation is an absolute essential of effective warfare, just as essential as the making of munitions, for the munitions, once made, do not become of value until they are carried to the fighting men.

The experience of the war in Europe has taught, too, the necessity of leaving a sufficient number of men on the land to insure adequate crops. A man who raises wheat or corn or produces meats is also engaged in war work. Professional men (except doctors), unskilled labor, and clerks would all be free to offer their services without much danger of being rejected on the score that they were more useful in their ordinary occupations. Men too old to fight and not engaged in the production of war supplies could find employment in time of war in one capacity or another with the Red Cross. That organization for the relief of the wounded is now expanding and modernizing its organization so as to prepare for eventualities. It is conducting classes in nursing, first-aid classes, and work in all the various branches of its field of activity. If you, man or woman, want to do Red Cross work or prepare yourself to do Red Cross work in time of war, a letter addressed to the American Red Cross at Washington, D. C., will bring you a reply if you state your qualifications and tell what volunteer service you think you can best render.

ASK THE COUNCIL OF NATIONAL DEFENSE

If you want to render any other form of war service, or if you are in doubt about what you should do, the Council of National Defense will tell you. An account of what the National Council is and what it is doing is printed elsewhere in this magazine. At present it is mapping and diagramming the resources of this country, having in mind both men and material. It is divided into committees covering various aspects of preparation. You have only to write to the chairman of the committee whose subject interests you and offer your services to be told what you should do and what use can be made of you. And remember, if you are the head of a business and the business can be useful, it is better to offer the business with you at its head than yourself alone. Address your inquiry to the Council of National Defense, Advisory Commission, Washington, D. C., and write to one of these men:

Dr. Franklin Martin, Chairman Committee on Medicine, including general sanitation.

Samuel Gompers, Chairman Committee on Labor, including conservation of health and welfare of workers.

Daniel Willard, Chairman of Committee on Transportation and Communication.

Dr. Hollis Godfrey, Chairman of Committee on Science and Research, including engineering and education.

Bernard M. Baruch, Chairman of Committee on Raw Materials, Minerals, and Metals.

Howard E. Coffin, Chairman of Committee on Munitions Manufacturing, including standardization and industrial relations.

Julius Rosenwald, Chairman of Committee on Supplies, including food and clothing.

In war with Germany under present conditions the most immediate needs, of course, are the organization of industry and commerce, including overseas shipping and its protection. This is all work of people behind the lines which enables the men actually fighting to continue. As a matter of fact, in an unorganized way all of us who have been engaged in producing or sending anything to the Allies have been releasing just that much of the Allied man-power to fight. The only difference is that if we were properly organized we could do a great deal more than we are doing.

Any one who can do anything in industry necessary in war or in transportation should write to the proper member of the Advisory Council of National Defense.

So much for the man who can best serve his country by staying on his job. Now for the five or six million who are eligible to become fighting men.

Any one who can help defend our coasts or can sail or fight at sea should apply to the commandant of the nearest naval district. There is a place for almost every one in one of the five classes of the United States Naval Reserve.

FOR EX-OFFICERS AND MEN OF THE NAVY

The first class of the Naval Reserve and the one which is naturally the most desirable includes ex-officers and men of the Navy. Men with this experience who are physically fit should join the Fleet Reserve, in which officers receive two months' pay and men from $50 to $100 a year. The members of the Fleet Naval Reserve have active duty in peace times only at their own request. In war times they are under regular naval discipline.

If you are a seafaring man between the ages of eighteen and thirty-five and you want to serve on a fighting ship in time of war, go to the commandant of the nearest naval district and tell him that you are a candidate for Class II, United States Naval Reserve. He will give you a provisional rank or rating, and as you serve your yearly instruction you will get your retaining pay. You will be assigned to a position for war service, and in case of war you not only can but must respond to the call.

The men of Classes I and II are the only men of the Naval Reserve who will be sent to the fighting ships.

MEN IN THE MERCHANT MARINE

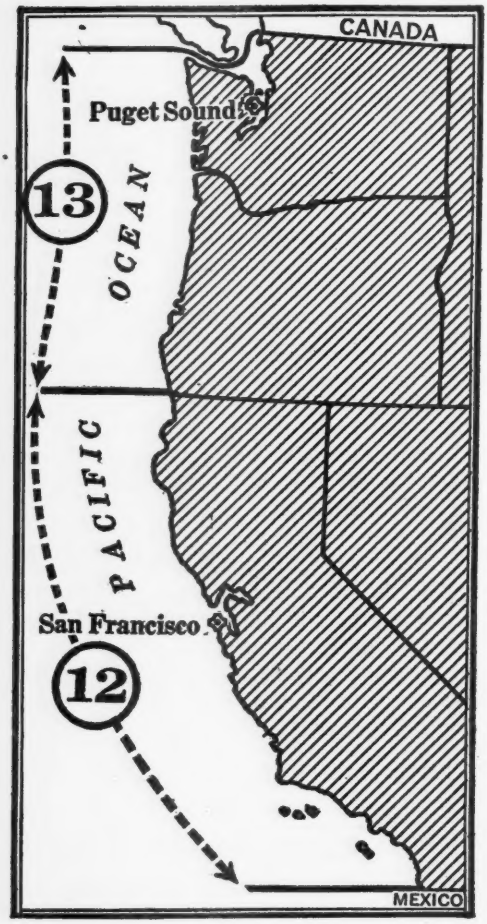
If you are an American sailorman on a ship that can be of any auxiliary use in time of war and are not particularly set on getting on a man-of-war, the wise thing to do is to notify the commandant nearest your home port that you want to join the third class of the United States Naval Reserve. It requires no training other than your regular work, but you get a couple of months' pay a year for having your name listed to be ready to do exactly as the Navy says in time of war. If you were the captain of a tanker that the Navy wanted in war time and a member of the Naval Reserve, as soon as you were notified you would take orders from the Navy instead of your company. If the company had put the ship in the Naval Reserve before the war the arrangements for compensation would already have been made. Otherwise, you would proceed just the same, only legally you would have captured your own ship and the company could arrange for the compensation later.

If you were a sailor on such a ship you would either serve under the Navy or lose your job. Consequently, the part of wisdom is for all Americans in the merchant marine not bent on active fighting to join the Naval Auxiliary Reserve, gain the retaining pay, and add tremendously to the Navy's ability to change from a peace to a war basis quickly and efficiently. But there is in all classes of the Naval Reserve one thing to remember. Don't join unless you mean to do what you agree to on enrolment. Forty per cent. of the paper strength of the National Guard vanished on the call to the Border. There can be nothing like this in the Naval Reserve. The Navy intends literally to take people at their word. The Naval Reserve is an organization for war purposes and war is a serious business.

THE NAVAL COAST DEFENSE RESERVE

If you are an amateur sailor, or a fisherman, or coastwise sailor, or tugboat hand, or in the lighter service, or suchlike, you probably can be useful to the commandant of your district in coast patrol, and you ought to go see. The commandant has power to enrol in Class IV, the Naval Coast Defense Reserve, anybody and everybody that he will have use for in time of war. Obviously he would want sailors for patrol-boat work, but less obvious and just as necessary are a lot of shore workers. He may need anything, typewriters, watchmen, electricians, marine engineers, marine lawyers, men who can supply patrol ships and repair them. If you want to do something for the Coast Patrol and are in earnest about it, and will write to the commandant telling him your age, experience, and what you think you can do, your letter will be given intelligent consideration, and if you can be useful you will get the opportunity.

But if you are working in a shipyard, do not apply to do other work. Through



THE NAVAL RESERVE DISTRICTS

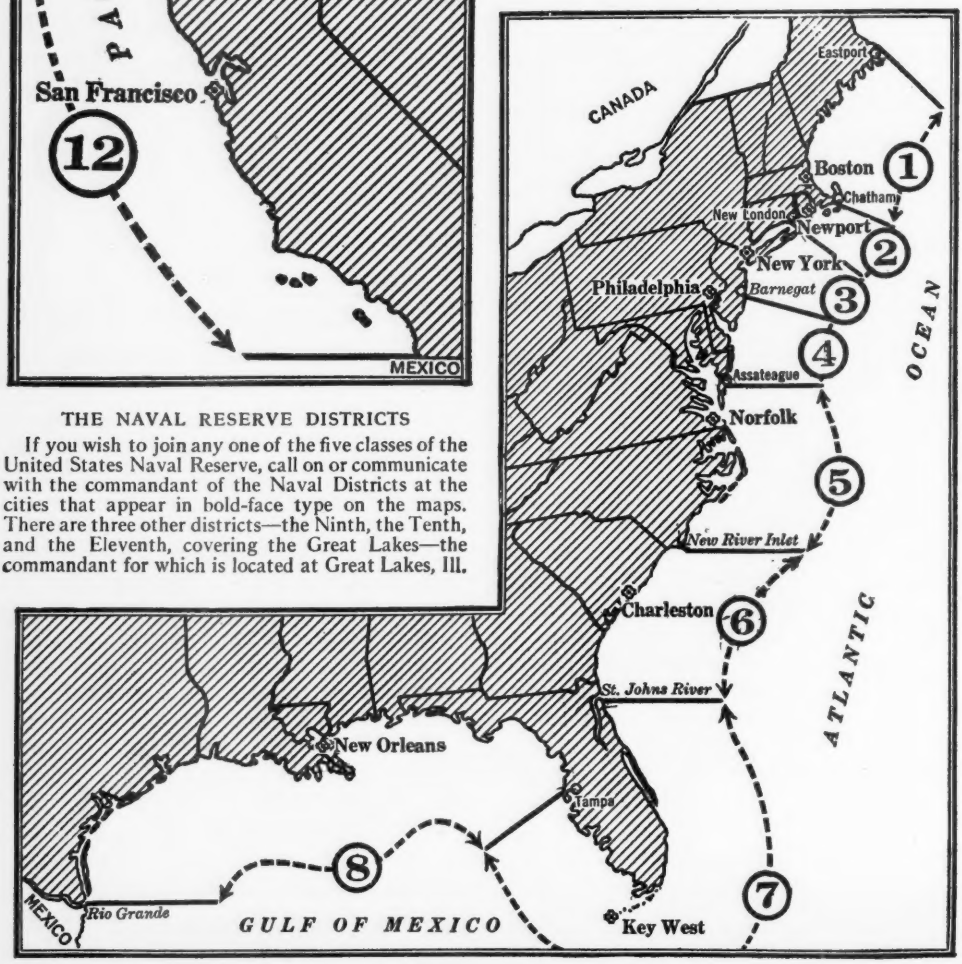
If you wish to join any one of the five classes of the United States Naval Reserve, call on or communicate with the commandant of the Naval Districts at the cities that appear in bold-face type on the maps. There are three other districts—the Ninth, the Tenth, and the Eleventh, covering the Great Lakes—the commandant for which is located at Great Lakes, Ill.

your own employer you can become a member of the Industrial Class of the Naval Reserve, and as such the Government would rather keep you where you are or move you when it is advisable than to have the beginning of war upset all shipbuilding and repairing by all the shipbuilders rushing off to try to join the active parts of the Navy. That would do much more harm than good.

FLIERS OR AVIATION MECHANICS

If you can build, repair, maintain, or fly an airplane, and you prefer the naval air service to the army air service, you can join the fifth class. The district commandants have this in charge also.

All five classes of the Naval Reserve get pay. Classes I and III get pay on



the basis of their previous experience. The other three classes get paid every year as they do their three weeks' active service. In times of peace they cannot be forced to do active service, although the Navy does not want men who do not intend to do this active service. If it is not done, of course there is no pay. All classes receive full pay of their rank in active service.

If a man wishes to donate his services to the Government he can join the Volunteer Naval Reserve in any of the five classes enumerated, and his status and duties will be just the same as if he were in the regular reserve except that he will get no pay.

During the last two summers there has been a training cruise for civilians given by the Navy, popularly called the Naval Plattsburg. These cruises were training for the Naval Reserve, but men who went on them were not in the service of the Government unless they enrolled in the Naval Reserve.

THE NAVAL MILITIA

There is still another way of rendering oneself eligible for war service in the Navy without going permanently into the regular service. The Naval Militia of the different seaboard and lake states affords a man an opportunity to learn the rudiments of the business. The Naval Militia is subject to some of the same disadvantages as the land militia. Dual control, even under the so called federalization of militia, is not an effective military arrangement. But any man who joins the Naval Militia will be a member of a force which the Navy intends to use in case of need, and therefore he would be sure of being of service.

The Naval Militia has not had such a test as the land troops had on the Border, and they cannot be subjected to quite the same test, for in any active service their numbers are much less in proportion to the Regular Navy than are the land militia forces to the Regular Army. However, the failure of the militia system on land, as exemplified on the Mexican border, is likely to militate against the future of the state naval organizations.

You can find out how to join the naval militia by writing to the Adjutant General of the following states and territories, at the capital of each:

California	Missouri
Connecticut	New Jersey
District of Columbia	New York
Florida	North Carolina
Hawaii	Ohio
Illinois	Oregon
Louisiana	Pennsylvania
Maine	Rhode Island
Maryland	South Carolina
Massachusetts	Texas
Michigan	Washington
Minnesota	Wisconsin

There is one other branch of the Navy which has a use for certain kinds of men. The Office of Naval Intelligence can use a limited number of men of good education who have traveled, are good linguists, and know foreign conditions. If you have these qualifications and have a desire to serve, you should write directly to the Office of Naval Intelligence, Washington, D. C.

If you want to do your part in seeing that the country has an army that would have a fair chance in any fight, the first and most useful thing you can do is to write to your Senator and Representative in Congress, urging him to work and vote for universal service.

THE ARMY RESERVE

The Regular Army, like the Navy, has a Reserve and, like the Navy, it is anxious to get all its ex-officers and men on its rolls.

If you have served in the Army you can enrol in the Reserve for four years. In war you will be called to active service. In peace you may be called for fifteen days' service a year, but this is not obligatory. As a private you will receive $24 a year and pay for all service performed. As an officer the pay is more, corresponding to rank.

If you have had no Regular Army service but nevertheless wish to join the Reserve as a private, the Army will take you on its rolls—that is, if you are in good health and between the ages of 18 and 45. You will get nothing for being on the rolls.

If you are called for training in peace and respond to the call you will be paid for the time you serve. In war you will be called and, of course, paid. This class of reserve does not amount to much in the infantry, cavalry, artillery, etc., because no training is provided. It amounts merely to a man's signifying in peace time that if a war comes he will volunteer for the length of the war. The Signal Corps of the Army has, however, taken advantage of this provision to enrol a reserve and it is at present training men in aviation—the Secretary of the Interior's son among others. There is an aviation officer at each department headquarters who will take care of any applicants, or a request to the Aviation Section, Signal Corps, U. S. A., War Department, Washington, D. C., will bring all the necessary forms to fill out.

To join the Army Reserve as private in any of the other branches, the applicant should go to the nearest recruiting station or write to the Adjutant General, U. S. A., War Department, Washington, D. C.

An ex-Army officer can join the Reserve in the rank at which he left the Army by writing to the Adjutant General.

Any one else who wishes to join the Army Reserve Corps as an officer must take an examination before a board of officers of the branch of the service in which he wishes to serve. Any man of good character and health and not above the age limit who can pass this examination can become an officer.

The age limit for second lieutenants is 32, for first lieutenants is 36, for captains is 40, and for majors is 45. In Boston, New York, and Philadelphia the Army has detailed an officer to give a course of lectures to fit men for the officers' examination, but these courses are supposed to be only for men who went to Plattsburg or some similar camp. If you live elsewhere and want to become an officer you will have to find some one who can prepare you for the examinations. About the only way to find such a person is to go to the nearest Army post and ask the officer in command if there is not some one whom he can recommend and also if he does not know other men who want to study for these examinations so that you can form a part of a class.

This is not nearly so hopeless as it sounds, for there are all over the country many of these classes in operation, and there is even at least one mail-order course of instruction.

In aviation only men between 21 and 27 are given training and only men between 21 and 30 are examined for commissions. But men between these ages who can fly are needed.

It will not help those who have already completed their education to know that the Government details officers to various colleges and other educational institutions to give instruction to fit their graduates to be Reserve officers, but all men who can influence boys in institutions that give such military instruction can help toward making a Reserve officer by encouraging students to take these courses.

Aside from the Regular Army Reserve, a man who wishes to serve his country at the front can join the National Guard of the state in which he lives.

No man who is more than twenty-five years old or who has any one dependent on his earnings should join the National Guard unless as an officer. This is because older men are not as good stuff to make soldiers of and because men with dependents cause suffering and economic loss to their community which unburdened younger men do not. Young men who joined the National Guard would certainly have a chance to serve in any immediate crisis, but they would also be in danger of helping perpetuate an inadequate system of national defense.

The whole question of how a man can best serve the United States in war is difficult to answer, because the Government has made no comprehensive plan for the utilization of the country's various kinds of abilities. The plans on which the Council of National Defense is working will serve this purpose if there is a universal service law by the time they are completed. Without that the plans will not be effective.

AMERICA OWNS ITSELF AT LAST

PAYING OFF THE MORTGAGE ON THE UNITED STATES

HOW THE BRITISH GOVERNMENT "COMMANDEERED" AMERICAN SECURITIES HELD BY BRITISH CITIZENS AND HOW MORE THAN $1,200,000,000 OF AMERICAN RAILROAD AND INDUSTRIAL STOCKS AND BONDS FOUND THEIR WAY HOME—OUR GIGANTIC LOANS TO THE ALLIES—WHAT IT MEANS TO BE A "CREDITOR NATION"

BY

ALBERT W. ATWOOD

American Finance was slowly recovering from the seismic shock of the European War's outbreak. The Stock Exchange had been reopened. Approximately $5,000,000,000 of a pre-war debt to Great Britain had been paid, and America had emerged from the category of debtor nations. Then came the rush of war orders and the tremendous sale of American goods to the Entente governments.

Then, to pay for these goods, a British and French commission came to this country in September, 1915, with the avowed intention of borrowing $1,000,000,000.

AMERICAN bankers were astounded at the request. It was not so much that the Englishmen and Frenchmen demanded an unsecured loan as the preposterous size of the suggested credit. With the exception of a very few government loans in times of national crises, the largest loan ever made in this country was for $162,000,000 on behalf of the subway in New York City, and the raising of this sum extended over a period of several years. It was figured that every "distributing" bond house in America with all their possible customers could not absorb more than $200,000,000 to $300,000,000. Sincerely convinced as the leading American bankers were of this fact, they finally agreed to make it half a billion, and not until the last moment did the foreign commission give up its idea of a billion dollars.

Great Britain and France would never have been able to borrow even half a billion if it had not been for the tact, diplomacy, and finesse of the chairman of the commission, Lord Reading. Along with the war's first two Chancellors of the Exchequer, Mr. Lloyd George and Mr. Reginald McKenna, Lord Reading, Chief Justice of England, formerly the Jewish lawyer, Rufus Isaacs, deserves much of the credit for such success as England has had in her war finance. Although he once said that he really knew nothing about business, and made his reputation as a great prosecuting attorney, yet there is no doubt that his eight years of apparently fruitless youthful experience as a stock broker and his insight into finance, gained from his many famous legal cases, had trained Mr. Isaacs's mind to a point where he could be supremely useful to his country in her hour of financial strain.

But even the proceeds of the great half-billion-dollar loan began to give out by April, 1916. England, France, and Russia have all sent great quantities of gold to this country, and it is still flowing in at this writing in unheard-of amounts. But it would be as disastrous to us as to Europe itself to absorb all their gold. "Small" credits of $50,000,000 have been obtained from American banks by the Allied countries, but these do not go far. By the summer of 1916 the inevitable and eventual series of secured loans began. In other words, Britain could no longer pay for her imports except either by selling back American securities to us or bor-

rowing from us with such securities as collateral.

Ever since the beginning of the war American stocks and bonds have been coming back in a fairly steady stream, sold directly by their owners. The total has amounted to perhaps $1,000,000,000. But even this was not enough. The British Government must commandeer, or "mobilize," American securities and feed them back to us as the exigency demanded. Critics of the British Treasury have described this as a system of semi-compulsory or forced loans for which history offers no parallel. But the British public had been gradually led up to it by dark hints and by such announcements of the Treasury as those forbidding new foreign investments and bank loans upon them. In November, 1915, the Treasury officials and Lord Cunliffe, governor of the Bank of England, conferred with the heads of insurance companies and investment trusts.

BRITAIN "MOBILIZES" OUR SECURITIES

The Prudential Assurance Company at once handed over to the Government something like a score of millions of dollars in American securities. The mere physical transfer involved great clerical and other difficulties, but was conducted with remarkable celerity. The trustees of four trust funds created by Andrew Carnegie turned in $25,000,000 of United States Steel Corporation bonds. Later reports from twenty investment trusts showed that from 30 per cent. to nearly 60 per cent. of their holdings of "Americans" had been turned in, in one case amounting to $5,000,000.

"We do not consider it a time to haggle about terms," said Mr. Robert Fleming at the meeting of one of these trusts. "Our existence as a great World Power is at stake. We know a great many businesses ministering to the prosecution of the war that have been making huge profits. Unfortunately, we have no interest whatever in the ordinary shares of any shipping, armament, coal, oil, rubber, or other manufacturing concerns which have benefited by the war. Our investments are mainly prior charges, with fixed rates of interest or dividends. We have not been war profiters at all. But equality of sacrifice is impossible to adjust, I fear."

But the Government did not trust entirely to the patriotism of the Britishers. Investors were at liberty either to sell or lend their securities to the Treasury. If they sold it was at the prices prevailing in New York, in many cases the highest on record. "Aside from patriotism," said Mr. Fleming, "why should any one here hold American railway 4's at 95 when he can buy first class English 4's around 80? Americans are not down but English debentures are off twenty points." If the investor lent his securities, the Treasury paid him one half of one per cent. a year in addition to the interest. If it should sell them without the owner's consent, as it reserved the right to do, it would pay him 2½ per cent. above the price.

That thousands of Britishers were patriotic enough to respond goes without saying. Early in the war, even before mobilization was hinted at, a Scotsman who had previously sent his securities abroad to escape taxation voluntarily sold them and invested in Government bonds. Even while the New York and London stock exchanges were closed in the summer of 1914, an English peer sold 1,000 shares of Great Northern at a price below its real worth because he felt that he must do his part. One of his sons had been killed and the other wounded in the Battle of the Marne.

THE "MOBILIZATION" IS EXTENDED

At first the Treasury called only for fifty or sixty American railroad bonds. Nor would it take less than $25,000 at first from any one individual. Then the limit was dropped to $5,000 and at the present writing they are discussing the advisability of taking less than that amount. The early list of fifty or sixty has stretched out to a thousand or so, including all manner of railroad and industrial stocks. The early "schemes" of mobilization included only securities in the United States, and English financial journals pointedly referred to the omission of Canadian Pacific stock and said that "it is obviously undesirable that control of this great Canadian railway should pass out of British hands."

But the later schemes swept into the relentless maw of the war god the shares of not only every Canadian railroad but those of South American railroads, bonds of the governments of Argentina, Brazil, Canada, Chile, Denmark, Egypt, Holland, Japan, Norway and Sweden, of the Swiss Government Federal Railways, and of the cities of Copenhagen and Stockholm.

In June, 1916, Chancellor McKenna told the House of Commons that it would be necessary to place a super-tax of 10 per cent. a year on the incomes of all persons owning American securities. This would be two shillings on the pound, and he told the House that the steady stream which had been flowing in for many months had now become a mere trickle, not because the supply was exhausted, but because holders required "a spur to remind them of their true duty to their country." He hoped that the Treasury would be able to secure all that it required without going further than this proposal, but if the tax proved inoperative he would have to make it five, ten, or twenty shillings on the pound.

Some very severe remarks were made by critics of the Government upon this application of compulsion to owners of property. The Chancellor turned upon his critics and asked why they were so suddenly to have these extraordinary feelings about their own shares. "Why should they not give up these shares as they had given up the lives of their relatives and were willing to give them up? Why were these shares suddenly to have a marked circle around them with a notice, 'Advance so far and no further?' The Government intends to enlarge the circle as need arises and will stop at no limit."

One member of Parliament, Mr. Urban H. Broughton, had spent twenty-five years in the United States as an officer of companies in which his father-in-law, Henry H. Rogers, had been interested. When the Chancellor finished speaking, Mr. Broughton arose and said that the Chancellor would be well advised to stick to his resolution.

"The resolution affects me more than any other man in England," he said. "All I have is in 'Americans.' I am perfectly willing to give them up. It is no hardship at all. I have already transferred more 'Americans' to the Treasury than any other individual in this country. I have lost nothing but have gained in interest and capital." Mrs. Broughton inherited one third of an estate appraised in 1914 at $40,000,000 and which must have increased since because of its large holdings of Standard Oil. It is reported that Mr. Broughton transferred nearly $20,000,000 of American securities. Whether Baron Astor, whose holdings of 'Americans' must have been nearly as large, transferred them or preferred to pay the super-tax, has not become known. Three duchesses and numerous countesses who have interests in the fortunes of the Vanderbilt, Goelet, Reid, Mills, Bradley-Martin, and other great American fortunes have also had an unexampled opportunity to demonstrate their patriotism for their chosen land. And as the English papers have grimly remarked, England has taken its revenge for the American invasion of its peerage.

THE RETURN OF AMERICAN SECURITIES

How many securities the British Government has mobilized is unknown to the outside world. The information has been refused even to the House of Commons. "An all-around game of secrecy is being played by the Treasury and its city advisors," is the way one irate English critic puts it. But there are probably excellent reasons for this policy. If American bond dealers knew exactly how many bonds were to be sold by the New York agents of Great Britain, they would slaughter values of even the most gilt-edged investments. President Loree, of the Delaware & Hudson Company, has estimated that in the eighteen months ending July 31, 1916, there were returned to this country $1,288,773,801 of railroad securities. But there are no figures to show the total returns of industrial and public utility securities, municipal bonds or mortgages, and closely or privately owned mines, breweries, and factories.

A few large corporations have published returns. The United States Steel Corporation, for example, reported, on March

31, 1914, that 1,285,636 of its common shares were held abroad as compared with 537,809 on September 30, 1916.

At times it is known that a single steamship has brought approximately 25 million dollars' worth of American securities from the British Government to J. P. Morgan & Company. It is said that if all the securities held in Great Britain and covered by a single one of the many mobilization lists had been turned into the Treasury something like $3,000,000,000 of par values would have been added to the Government's available resources. But of course we do not know whether they were all turned in. Rumor has it that the British Treasury had under its control in New York City at one time several hundred million dollars of American investments.

But we do not need any more exact figures to realize the extraordinary skill which has been required to feed out this enormous volume of investments without smashing the market. In no other branch of trade does the knowledge that a large block is overhanging the market have a more depressing effect than in the marts of finance. Shrewd and eager buyers gather like famished wolves and, despite the dignity and urbanity of the banking profession, the buyers will in all seriousness offer prices for the highest grade bonds as ridiculously out of proportion to their real worth as the bid which an old-clothes peddler makes to the careless college student for a suit "as good as new."

THE ACTORS IN THE FINANCIAL DRAMA

The firm of J. P. Morgan & Company is a large organization of highly trained and skilled men. Mr. J. P. Morgan himself lived and worked in London for many years. All the higher officials of the Government know him and trust him. They like him, too, because he is no time-server and has never gone out of his way to seek their favor. No man is further from a pretender than is this direct, blunt, and huge physical specimen of mankind. With an unusual fearlessness he stands up to every storm that blows, and seeks no personal credit for himself for any of his actions as a financier.

Mr. Morgan's standing and acquaintance in London and his contribution of simple but outstanding character, together with the long experience and familiarity with the intricacies of big finance possessed by his partners, Mr. Henry P. Davison and Mr. Thomas W. Lamont, have made his firm the natural channel through which this greatest of all migrations of capital has passed..

Messrs. Morgan and Davison have carried on the negotiations with London, with the active assistance on this side of Messrs. Lamont, Porter, and Morrow, the last-named working out the complex legal problems involved.

A MAN WHO "KNOWS SECURITIES"

But the almost incredible mass of detail and technical work that, necessarily, is connected with the actual sale of the securities has been attended to by a young man, not yet thirty-five, of whom the public has never heard, Mr. Arthur M. Anderson. He had been connected with the firm only a few years as manager of the bond department, a position whose importance in normal times was probably far less than the uninitiated might suppose because the firm was not a distributor of bonds and its main work was banking, rather than investment dealing in the ordinary sense. But the importance of Mr. Anderson's position to-day can hardly be exaggerated.

His secret is the very simple one of study and knowledge. By the sheer power of driving hard work he has mastered every one of the thousands of securities which the British Government might have occasion to sell. He knows the old-fashioned railroad bonds, the very existence of which had been forgotten by most bankers and brokers. He knows who will buy, how much, and when.

Mr. Anderson has spent many weeks in the British Treasury offices going over lists and deciding which securities and how many of them to include in the shipments to America. He told them which they could sell and which they could not. On this side he does the actual selling. He does not give bond houses and the investment managers for rich estates and in-

dividuals long lists to paw over. He does not tell them how many bonds he has to sell, what the total amounts are, or even the names of them all.

"Can you use half a million of Northern Pacific 3½'s?" he asks one buyer. Or the buyers say: "We can use divisional bonds to-day. Have you any?" Huge sums have been sold on the Stock Exchange, even larger amounts privately. Private sales as high as $10,000,000 have been made, although usually the individual sales are smaller. Thirty or forty separate private sales have been made in a day, ranging, in the values of securities involved, from relatively small amounts up to many millions of dollars.

AMERICAN PROPERTIES REPURCHASED

Even to sketch or indicate the variety of her securities which America has purchased is impossible. Although the wealth of this country had almost reached a point where, perhaps, we might at least have begun to shift from a debtor to a creditor nation, yet the war has accomplished in a few brief months what under even the most prosperous of normal conditions would have taken a generation. The long lists of mobilized securities include not only the bonds and stocks of every important railroad and industrial company, but literally hundreds of the old underlying subsidiary lines out of which our great modern systems grew, such as the United New Jersey Railroad and Canal Company, now an integral part of the Pennsylvania. To most people even the names are wholly unfamiliar.

There is the 6 per cent. guaranteed stock of the Tunnel Railroad of St Louis, held by the executors of some old estate in England ever since 1889, undisturbed by panics until the war, the greatest of all upheavals, came along. There is a little local water company in the mountains of California owned by the British ever since the state was settled but now the property of local capitalists. A complete railroad, the New Orleans & Northeastern, has been sold back bodily to Americans. These are but random instances.

England has been jealously husbanding her American collateral, trying hard to keep what she prized the most but gradually letting go these, her priceless financial resources, piece by piece.

For more than two years London has been undergoing a noiseless form of earthquake. The financial organization that existed there at the outbreak of the European War has fallen to pieces bit by bit. London's normal business of banking for the world has been wound up and all the country's capital has gone into its own government securities. We do not know how long this process can continue, but already England and her allies have exchanged the right to a large share of the grain and cotton and beef of America for the promises of their own governments. Europe has given up a large share of the industrial production of the United States and has in its place only the income of its own taxation.

THE NEW CREDITOR NATION

It will be hard, not only for them but for us, to realize that as a result of this wholesale migration of negotiable securities from one country to the other a great stream of interest and dividend payments no longer flows eastward from New York but that a new stream of such payments has started flowing from London westward. For we have not only bought back our own obligations and are taking the place of England and France as bankers for Canada and South America; we are actually lending to English and French cities. It is even probable that the French railroads may have to borrow in this country. If the war lasts long enough we will take over Great Britain's interests not only in her own colonies but in some of her own home industries as well.

These are the events which are making the United States a creditor nation for the first time in the Nation's history.

A TUNNEL FROM ENGLAND TO FRANCE

UNDER THE ENGLISH CHANNEL, THROUGH A SOLID STRATUM OF GRAY CHALK, MADE PRACTICABLE BY MODERN ENGINEERING AND MADE DESIRABLE BY THE USES TO WHICH IT COULD HAVE BEEN PUT IN THE PRESENT WAR—THE LIKELIHOOD THAT IT WILL BE BUILT AS SOON AS PEACE IS DECLARED

BY

GORDON D. KNOX

GREAT BRITAIN has grown friendly to the proposal to construct a tunnel between France and England. This change of feeling has come since the beginning of the war and notably during the last few months, and there seems at last every probability that the British opposition will now be definitely withdrawn.

Imagine what the advantages to Great Britain would have been if the tunnel had been open for use when this war began. From the moment of the declaration of war it would have been practicable to send heavy trains through the tunnel at ten-minute intervals; in other words, the Government could have sent more than 100 trains in every twenty hours, leaving four hours in the day for the up-keeping of the tunnel. By means of these trains, 60,000 tons of material a day could have been transmitted in either direction—which is a good deal more than the actual requirements now. And if this facility in provisioning British troops were to shorten the war by only two days, the saving in actual money would pay the whole cost of construction.

As an engineering feat the tunnel presents several points of interest. When complete it will be the longest tunnel in the world, the present proposal being that it should be thirty-three miles long from end to end. The essential of the scheme that has been prepared by M. Sartiaux, the engineer of the Nord Company, and that has been agreed to by engineers in both France and England, is that the tunnel should all the time keep within the impervious stratum of the Lower Gray Chalk, a stratum that is 187 feet thick at Dover and 180 feet thick at Sangatte. Two independent circular tunnels are to be bored side by side, and these are to be connected at frequent intervals by galleries to promote the ventilation of the tunnel. For the purposes of drainage and to make feasible the removal of the vast masses of material with which the engineers will have to deal, two galleries will be driven to the centre of the tunnel from the French and English sides, sloping down from the centre of the tunnel to the shore ends, where powerful pumps will be installed to deal with any water that may percolate through into the tunnel. All along the length of the tunnel secondary galleries will be driven, connecting the tunnel with this main gallery. During construction the material excavated will be removed downhill, to be lifted up at the shore end, far from the site of the work, and when the tunnel has been constructed it will be drained permanently by the force of gravity and by the work of pumps at the shore ends.

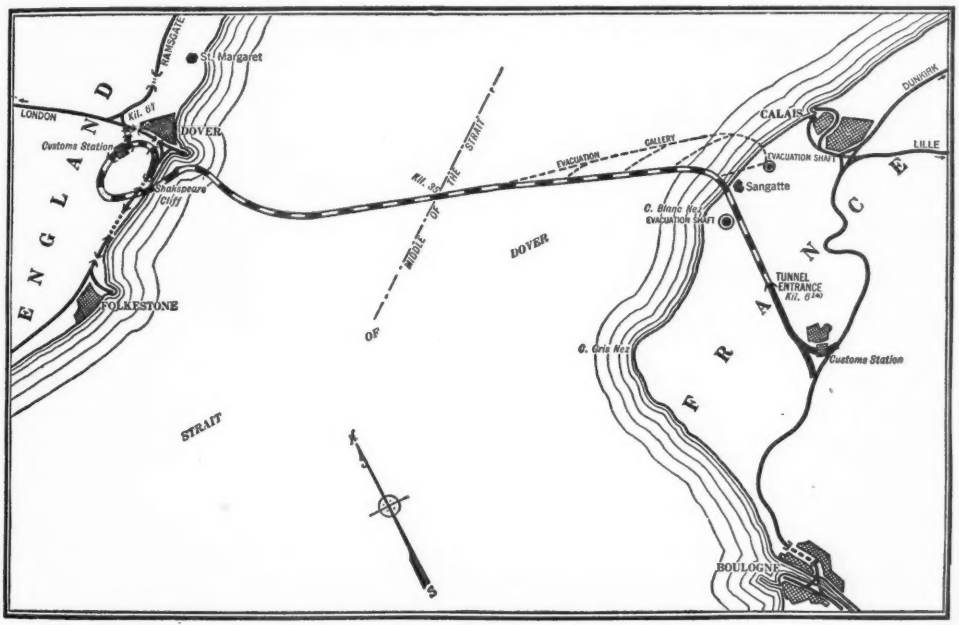
In 1876 and 1877, the French geologists, Messrs. Potier and Lapparent, using a machine designed by Sir John Hawkshaw, took 7,600 samples of the bottom of the Channel, 3,267 of which they were able to use. They found to their satisfaction that it was possible to follow the strata that dip gently to the north the whole way across the Channel, and that the line of outcrop was very nearly parallel with a line joining Folkestone to Sangatte.

One of these strata or layers is known as the Lower Gray Chalk, or the *Craie*

Grise or *Craie de Rouen*, and wherever it has been studied it has been found to be free from fissures and slides. It is reasonably soft material, somewhat similar to Portland cement, and has the valuable property of "puddling" itself so as to become absolutely impervious to water. It is in this stratum that is between 180 and 190 feet thick that the engineers have decided the tunnels should be constructed. In a lecture delivered before the congress of the Franco-British Travel Union in

(c)—That the presence of any such fissure can be foretold with certainty, and without risk to the men employed, by providing a pilot drill to be attached to the boring machine, an advanced trial hole being thus always kept in front of the excavation.

(d)—That, should such a fissure be encountered, due precautions can be taken according to well-tried engineering methods, which, in the opinion of the French and British engineers, would ensure the



THE LONGEST TUNNEL IN THE WORLD

The present proposal for a tunnel under the Strait of Dover provides that it shall be thirty-three miles long from end to end. The daily freight-transporting capacity of such a tunnel would equal that of from twenty to thirty cargo steamers of the type that cross the English Channel

London in September, 1913, Sir Francis Fox defined the fundamental points on which he and the French engineers were in agreement as follows:

FOLLOWING THE CHALK LINE

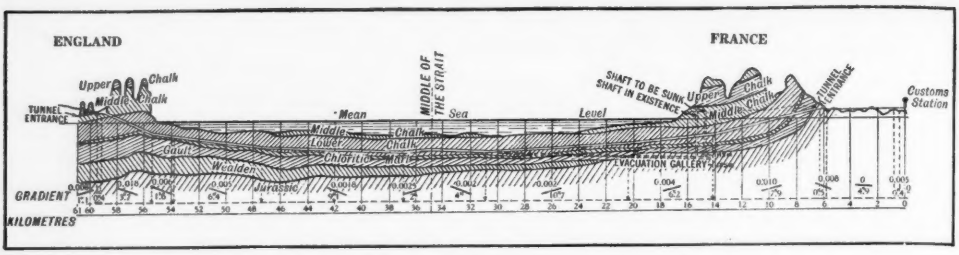
(a)—That the proposed tunnels can be constructed throughout in the Lower or Gray Chalk, a stratum very homogeneous, practically free from and remarkably impervious to water.

(b)—That the occurrence in the Gray Chalk under the Channel of water-bearing fissures is improbable, but not impossible.

work being carried past the fault, any water arising from such fault being duly excluded.

(e)—That a drainage heading should be driven from each side of the Channel, rising toward the centre, and connected at Dover and Sangatte with shafts for pumping and winding.

(f)—That the main tunnels should consist of two single-track circular tunnels, each of 18 feet net internal diameter, and thus large enough to accommodate the rolling-stock of the British and French main lines, except only their locomotives, for which would be substituted electrical



CROSS-SECTION OF THE BED OF THE ENGLISH CHANNEL

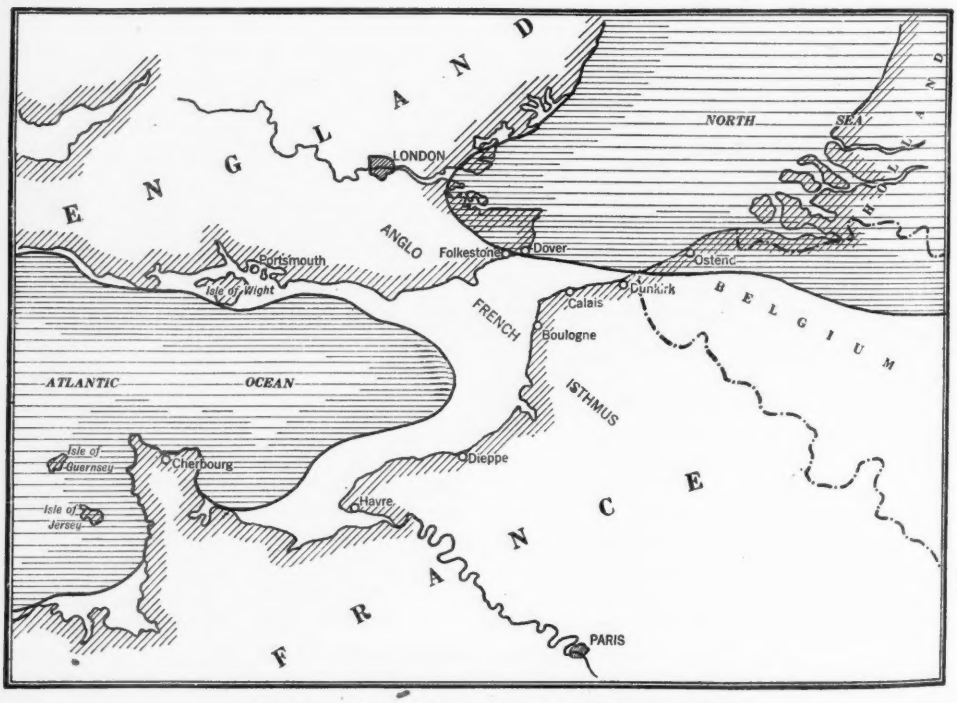
Showing the various strata or layers of which it is comprised. The line of outcrop of these layers is nearly parallel with a line from Folkestone to Sangatte

locomotives of ample power to deal with the heaviest trains running upon the main lines.

(g)—That there are several great advantages to be derived from this plan, as compared with the construction of a double "two-track" tunnel, namely: the vertical dimensions are thereby thus much reduced, rendering it easier to adjust the position of the tunnels in the Gray Chalk; the ventilation of the works, both during construction and after completion, is rendered simpler and more efficient; the cost of any lining is much reduced; and the work can be more readily carried out by the well-tested system of shield, combined with mechanical excavators.

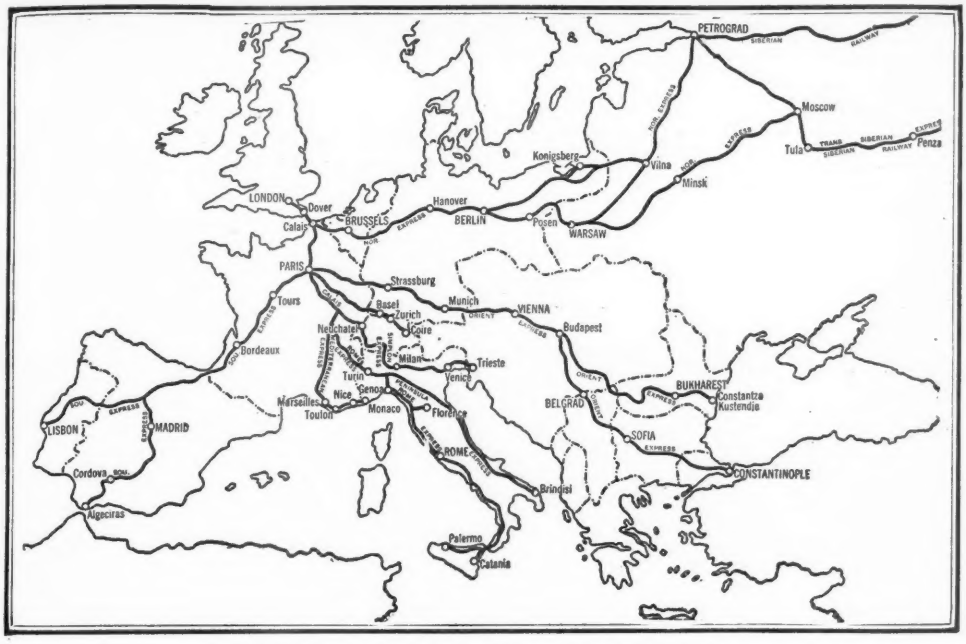
(h)—That the tunnels should at frequent intervals be connected by cross passages, with air-tight doors, thus rendering it easy to introduce currents of air, and to exchange workmen from one tunnel to the other.

(i)—That the tunnel should be well lighted and thoroughly ventilated, and the traffic worked by electricity.



ENGLAND AND FRANCE IN THE MIOCENE ERA

When the coast line extended farther into the ocean and the isthmus between England and France had not been cut through

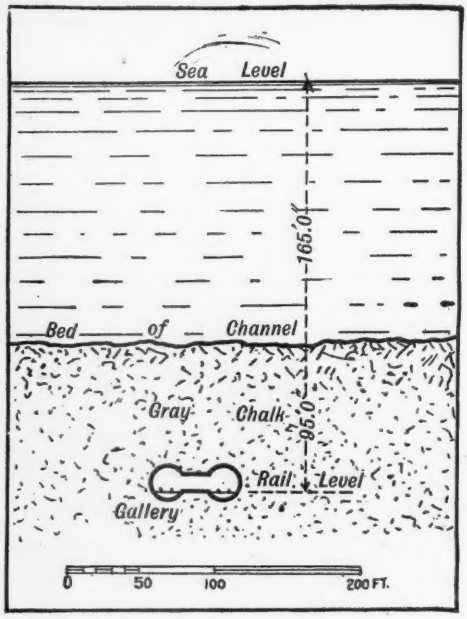


CONNECTING ENGLAND WITH THE CONTINENT

The chart shows how a channel under the Strait of Dover would bring England much nearer, by railroad connection, to the great cities of continental Europe

Many difficulties threaten the tunnel engineer, but there is no reason to anticipate any serious danger in the Channel Tunnel enterprise. A temperature higher than about forty degrees is not anticipated, and ventilation will be an easy matter, for in the first place it will be possible by means of fans to keep a steady current of air flowing in through one of the tunnels and out through the other by the most recently excavated traverse, and secondly the galleries by which water and material are to be removed will provide another approach through which air can be pumped. This general system of ventilation has been found adequate to keep all the galleries and traverses in a perfectly fresh condition, while there would be no serious difficulty in supplementing the supply at the actual working face by means of secondary ventilation.

The most original idea worked out in the construction will be the driving of a drainage gallery. This will start from either end of the tunnel, at about 400 feet below the sea level, and will rise gradually to meet the centre of the tunnel, which at that point will be about 350 feet below sea level. It will serve many objects. When the tunnel is completed its main function will be to drain off any water that may percolate in, but during construction it will not only serve this purpose but will be used to help in the removal of the excavated material, will enable the tunnel to be planned out with the utmost certainty, and allow it to be built with the least delay and the most facility. All the time that the gallery is being driven, borings will be made to explore the strata, and thus by making any slight modifications that may be required in the alignment it will be an easy matter to keep the tunnel well within the limits of the Gray Chalk stratum. Further, though in most tunnels there can be only two working faces, the method will allow of as many working faces as are desired, for the work of excavation will be able to proceed from each of the cross-galleries that are driven to the line of the main tunnel. The amount of material to be excavated is enormous, calculated at 140,000,000 cubic feet, or one thirtieth part of the excavation required for the construction of the Panama Canal. To deal with it, a double-track



FOLLOWING THE CHALK LINE

The plan for the tunnel calls for its construction through the stratum of Lower Gray Chalk (under the English Channel) that is 187 feet thick at Dover and 180 feet thick at Sangatte

electric railroad will be installed in the cross-galleries and drainage tunnel, and it is estimated that débris will pass along this at the rate of 4,000 tons a day, representing the passage of 100 trains a day in each direction; in other words, a volume of traffic greater than that borne by many railroads.

Time and cost have been very carefully considered. The tunnel should be completed in from four and a half to five years, on the basis of about seventeen yards' progress a day on each face. Various estimates of the cost have been made, but the figure at present accepted is about $80,000,000, or roughly about $2,500,000 a mile. As yet it is obvious that no exact data exist on which it is possible to calculate the possibility of profit or loss. But, roughly, the elements of the problem are as follows: Approximately 1,300,000 passengers might be expected to use the tunnel, and at ten shillings (about $2.50) a head these would bring in a revenue of $3,250,000 a year. Luggage charges would add 10 per cent., or $325,000, and the postal service $200,000, while goods traffic might yield $4,000,000, or a total of approximately $7,775,000. Working expenses would not be unduly high and are estimated as follows:

Cost of working train service . .	$ 540,000
Expenses at termini	200,000
Repairs and upkeep	400,000
General charges and sundries . .	420,000
Pumping and lighting	540,000
Total	$2,100,000

This would leave $5,675,000 as profit on the estimated capital of $80,000,000.

The practicability of the tunnel has been greatly facilitated by the use of electric traction. The tunnel has to drop for 350 feet below sea level in half the way across, thus giving roughly a mean gradient of 1 in 230 and in places, of course, a very much steeper gradient. Nor, because it has to follow the Gray Chalk, does its line run straight from shore to shore. On an ordinary railroad line such, for instance, as the line running between Paris and Calais, there are only such gradients as 1 in 500. And on such a road, no curve less than one of 800 or 1,000 feet can be allowed, while for a high speed 2,500 or 3,000 is the smallest radius permissible. These facts make the problem of the Channel Tunnel a difficult one, but with electric traction the difficulties have largely vanished, for with electricity gradients such as 1 in 75 or 1 in 100 are feasible, and curves of 800 or 1,000 feet radius present no very great difficulties for reasonably fast running.

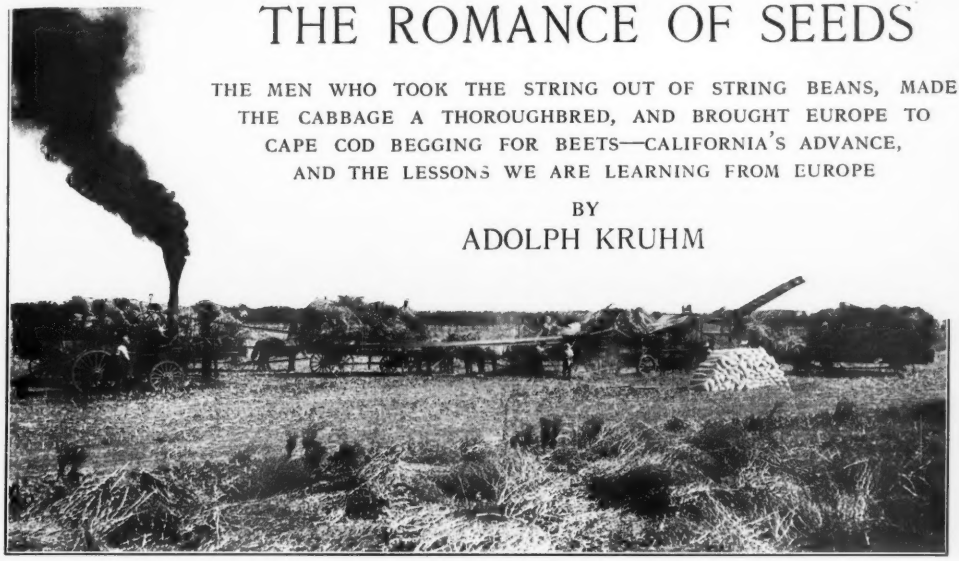
There remains the problem of imperial defense, but this, according to Lord Sydenham, one of the leading experts on defense, presents no real difficulties. At the request of the promoters of the tunnel scheme, he has outlined a system whereby absolute security could be ensured. This, he writes, might consist of (1) a fort at Dover, (2) a portcullis arrangement in the tunnel itself, to be raised and lowered once a week as a matter of routine, (3) an arrangement for flooding by sluices, (4) the power station, exposed to fire from the forts, to control movements in the British half of the tunnel, (5) an open portion of the line exposed to fire from the sea, and (6), which he does not consider necessary, mine chambers to enable the crown of the tunnel to be blown up.

THE ROMANCE OF SEEDS

THE MEN WHO TOOK THE STRING OUT OF STRING BEANS, MADE THE CABBAGE A THOROUGHBRED, AND BROUGHT EUROPE TO CAPE COD BEGGING FOR BEETS—CALIFORNIA'S ADVANCE, AND THE LESSONS WE ARE LEARNING FROM EUROPE

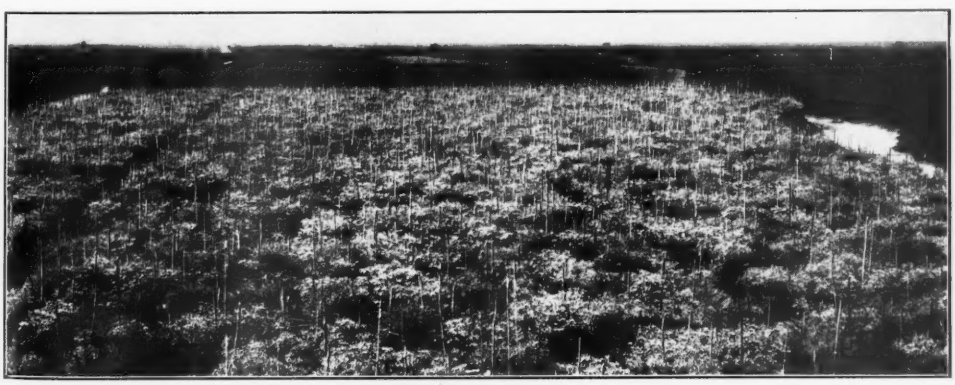
BY

ADOLPH KRUHM



THIS country to-day holds a position without parallel in the seed history of the world. The agricultural and horticultural development of the United States has proved conclusively that, between the Dakotas and tropical Florida and between the coast of Maine and the Golden Gate, nearly every vegetable, fruit, and flower from anywhere can be nursed to maturity and will bear seeds. How this fundamental truth affects us, as a nation, what has been done to capitalize these natural resources, and the future which it opens up to us is one of the most fascinating chapters in American history.

The development of the business of seed-growing into an industry of recognized importance occurred almost simultaneously in this country and in Europe. Prior to the beginning of the nineteenth century, the distribution of seeds was conducted largely on a basis of barter. In those days, the market gardeners were the real seed men of the world and their surplus, disposed of by "swapping," or across the market bench, supplied the world with vegetables. But the country quickly out-



"PEDIGREED" PLANTS

A field of "pedigreed" cauliflower plants going to seed. The stakes carry the numbered papers of truly registered stock

AN OHIO ONION FIELD IN SEED

The five-foot-deep humus beds of the Buckeye State produce surpassing quality crops each year

grew this method. It soon dawned upon men engaged in the business on both continents that the business of growing seeds was one quite distinct and apart from that of selling seeds. The working out of this problem in this country gave birth to the modern American seed house, which has been a greater force, perhaps, than any other in making America the world's seed garden which it is to-day.

From the start, America assumed the leadership in the production of high-class seed specialties, particularly among vegetables. It is significant, however, that this lead of early history was the result of favorable climatic and soil conditions rather than of unusual efforts on the part of the growers. The soils of Massachusetts grew squashes which far surpassed in size and quality any grown on the other side. Connecticut onions commanded a premium of 30 per cent. over those grown elsewhere. Melons and tomatoes did better in New Jersey than they ever could in the Old World.

As in nearly every other line of human endeavor, the business of seed-growing in this country at first followed the line of least resistance. Wherever soil and climate proved favorable and a certain

TONS OF RADISH SEEDS

Growing on a California ranch. As yet, American-grown radish seeds do not come up to European standards

amount of intelligent labor was available, there sprang into existence gardens, acres, plains or whole sections devoted to seed-growing. In due time we became independent of Europe in such vegetables as found a most congenial home here. Soon after the Civil War, European beans, lettuce, onions, peas, and tomatoes were of past history here. The most momentous step toward leadership in seed production was taken, however, in 1875, when California was "discovered" to be especially fitted to produce quantities of popular vegetable and flower seeds of such a quality as only a Californian climate can produce.

From the standpoint of the seed-grower, California is a veritable Garden of Eden. For untold centuries, the elements have washed down from its mountain sides the soil that now fills the valleys with unmeasured fertility. For six months of the year, Nature accommodates the grower with cloudless skies. Rain at seed-harvest time is a rare occurrence in California; hence the seeds grown there are bright, plump, full of vigor and vitality. To carrots, lettuce, onions, and radishes, Californian soils and climate present ideal chances for perfect development such as probably no other part of the world can

"ROGUEING" CALIFORNIA SWEET PEAS

"Rogueing" is the term used to describe the process by which groups of men remove the flowers that are "off" shape or color

claim. As a result, crops of 600 tons of carrot seed, 500 tons of lettuce seed, 600 tons of onion seed, and 400 or 500 tons of radish seed are an annual occurrence in the Golden State—almost inconceivable quantities from the standpoint of the home gardener who is accustomed to handle these seeds in "packets" containing a fraction of an ounce.

The most romantic part of California's seed industry is the rise of the sweet pea to the first place among the world's most popular annuals, and California has put it there. More than 125 distinct varieties are now grown every year, one grower alone devoting nearly 200 acres to them. At present, the growing of high-class sweet pea seeds in California eclipses anything ever attempted in the history of the seed business. Two thousand acres yield more than 1½ million pounds of seeds every year, several hundred tons of which were exported to Europe prior to the war.

Nor are American activities in seeds confined to sections already mentioned. Along the mountain ranges of Idaho and Montana thousands of acres bloom into miles of garden peas grown for seeds only.

DRYING ONION SEEDS

On a ranch in California. So secure is this climate from sudden showers that seeds remain stacked outdoors for days

An estimate by one of America's foremost specialists in growing this crop places the total annual yield at $1\frac{1}{2}$ million bushels. And he adds the significant phrase: "I believe that when this announcement is made there will be many, even among seeds men, who will consider this a romance, pure and simple." Yet, he is convinced that his figures are conservative, both as to the 75,000 acres devoted to peas and the yield mentioned.

Can you imagine what quantity one million pounds of cucumber seeds represent? There are enough seeds in that quantity to give each man, woman, and child in this country a modest patch of pickles. Yet, this is only Colorado's contribution to this country's cucumber seed supply, with Nebraska, Kansas, and New Jersey providing an equal amount.

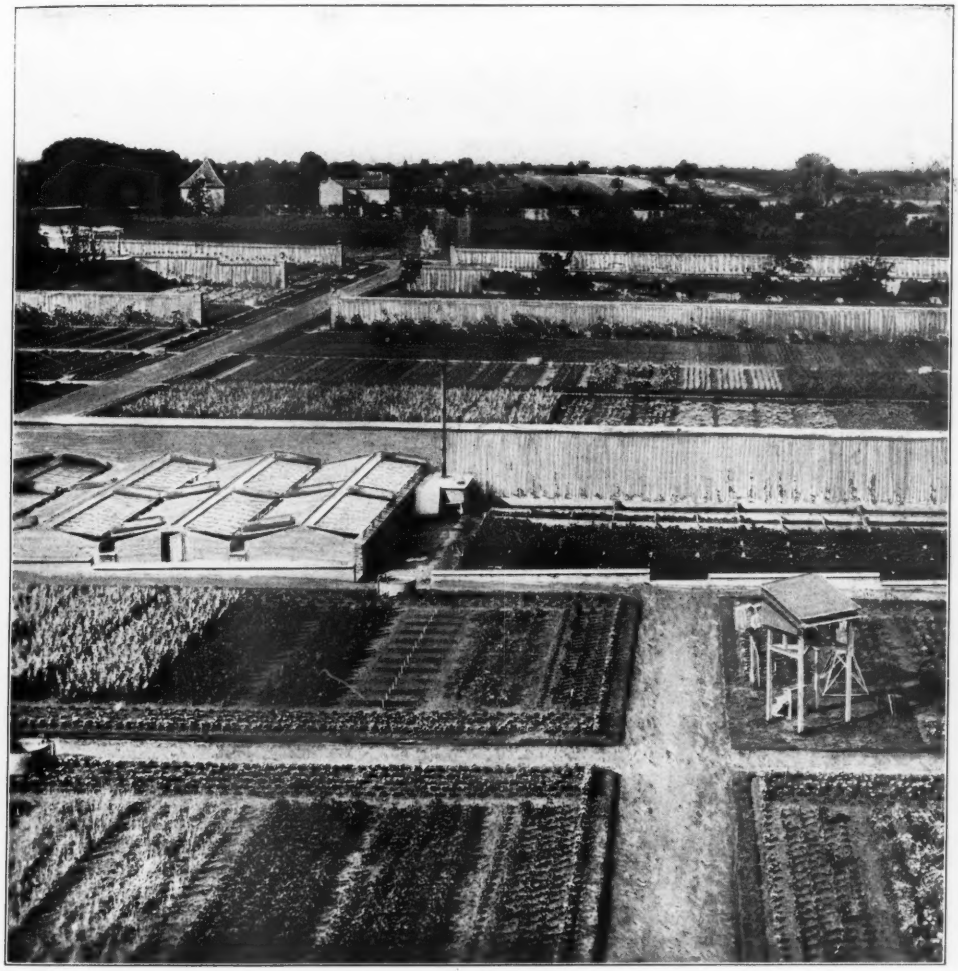
Have we, then, achieved the desirable independence and security in seed supplies for which our unrivaled natural resources should stand? Are we prepared to maintain our present lead unaided when thousands of trained European seed growers will leave the trenches to return to the peaceful pursuits for which train-

A TENT COLONY OF BEETS

Pedigreed French sugar beets housed in tents. For work of this kind France dedicated a monument to the House of Vilmorin

ing has equipped them? It is well that, at this time, we should look our situation squarely in the face, analyze true conditions, and act accordingly, so that we may enjoy our inheritance to the fullest extent in years to come.

At the outbreak of the European War, about 50 per cent. of all vegetable seeds and 90 per cent. of all flower seeds (other than sweet peas) used in this country came from Europe. For this, America paid Europe the tidy sum of several million dollars annually. Why? While Nature has endowed us with practically perfect soil and climatic conditions to a marvelous extent; while we are producing seeds in staggering quantities, we have been all too willing to disregard the human element which enters so largely into the production of that evasive element known as quality in seeds. The quality in seeds which is visible to the eye—bright appearance and plumpness—has nothing to do with the inherent qualities of the same seeds. These will not become visible until the crops grown from the seeds mature, and then it is too late to remedy losses due to inherent defects of the seeds.



EUROPE'S FOREMOST SEED GARDEN

At Verrières, near Paris, where scientific research, in coöperation with Nature, strives for maximum results in the plant world

It is particular attention to this detail which makes European seed growers our successful rivals in the world's seed market. Despite our lavish natural advantages, we are far from being beyond competition for years to come. Before we may become entirely independent of European seed gardens without sacrificing the inherent qualities of the different races of vegetables and flowers, we must become more proficient in the practice of patience and thoroughness, to which should be linked a distinct devotion to idealism.

Just how the application of these enters into the production of seeds with inbred qualities may best be illustrated by a few incidents of a trip through the seed gardens of the Old World that I made just before the outbreak of the present war. I visited the monument dedicated to the House of Vilmorin by the Republic of France because of its achievements and leadership in pedigreed seed production. While walking through the wonderful trial gardens at Verrières, near Paris, I asked the guide to point out to me an example of the type of work which caused the country to show its appreciation in such magnificent form. In response, he conducted me to a village, unlike any other I had ever seen.

A TYPICAL CALIFORNIA SEED RANCH

The crops are planted every year in checkerboard fashion to reduce dangers of mix-ups at harvest time

It was a village of tents, each about seven feet high and a yard in diameter. Within these tents grew the priceless mother-plants perpetuating the race of high-bred French sugar beets. A man was in charge of the tent colony whose sole duty consisted of watching these plants and nursing their seed crop. An approaching storm would find him busy covering his charges with the folding tents, sunny weather would cause him to expose them to heat, light, and air. But always the welfare of these plants would be of paramount importance to him. Why?

A year prior to this, experts in type selection had walked many miles up and down the rows of acre after acre of fields planted to beets of this variety for seed production. From a ten-acre field, containing approximately 250,000 roots, they selected about 2,500 as coming up to their conception of an ideal specimen, consider-

ing size, color, and shape of the root. These elect 2,500 roots were then carried to a laboratory containing the latest and best devices known to mankind to ascertain physical values and sugar contents. A sample of the pulp of each root was subjected to the most searching tests to find the exact percentage of sugar it contained. Only those roots containing the highest percentage of sugar, plus the most pronounced characteristics holding promise of special value to the race, would be chosen for the work of perpetuating the strain.

Perhaps only 10 per cent. of the total would pass the ideal mark set for the examination. Often, this stands for less than one tenth of one per cent. of the roots grown in the field from which the experts made their selection. No wonder a special guardian was appointed to watch the plants grown from these critically selected roots the following year.

Every shell bursting over the trenches in Europe to me has shrieked "skill" and every advance has spelled "patience." Patience and skill are needed in America today, quite as much as resources. Patience and skill we must acquire before our resources can be turned from a liability into an asset. American seed growers must persistently keep ideals before them and strive for their attainment. For some time to come, the mercenary spirit must give way to the vision of a quality which will add further laurels to American enterprise and initiative. This is the ideal which has helped the master seed growers of Europe to the highest place in the esteem of the seed-using world, and has enabled them to maintain their position against the most strenuous competition.

Fortunately, this country can boast of a select body of master seed growers who practise European ideals in seed selection and production with a devotion as commendable as it is profitable. Out on Long Island lives a man who has devoted his life to studies of the humble cabbage family. He knows all the members of the family by name—and they run into scores. He nurses them from babies to full-grown plants and nurses the plants the second year until they bear the desired crop of seeds. That man knows cabbages, and the world pays tribute to him by offering 50 per cent. more for every pound of seed he grows than for other seeds of the same kinds obtainable elsewhere.

Up in Massachusetts, a seed grower specializes in the production of thoroughbred strains of beets and carrots. For years this grower has taken special pride to grow only such roots for seeds as would measure up to his ideals. For years, a critical body of market gardeners in the most exacting section of this country—New England—has insisted on this grower's strains, no other proving acceptable. In due time, such fame spread to the ears of eager Europe. We now behold the unusual spectacle of some of the master seed growers of Europe securing their seed stocks of table beets from a Massachusetts grower and paying him the retail price of one dollar a pound for every pound of seeds he is willing to furnish.

Up in central New York, a veritable human dynamo, sixty years young, is evolving for America finer races of peas and beans than the world has ever known. Future generations will come to know Mr. C. N. Keeney as the man who took the string out of the string bean. All his life he has worked over beans. Almost thirty years ago he evolved the first bush beans that were really fit to be eaten: Stringless Green Podded. Since then, almost a score of new varieties have been evolved by him, some green, some yellow, some flat, some round, some early, some late, but *all* without strings.

The war has, to a certain extent, shut off many seed supplies, especially flower seeds. An unprecedented famine of the choicer kinds stares us in the face. To make the best of this war-made opportunity, American growers are putting forth tremendous efforts. Yet, in them, they are singularly handicapped because of the limitations of available skill. And because to us, as an agricultural and horticultural nation, those tiny things called seeds are of paramount importance, it well behooves the leaders of our nation to display interest and aid in the carrying on of constructive work which will help America to that position in the world of seed production to which its natural resources entitle it.

THE PATH TO AGRICULTURAL PREPAREDNESS

SINCE the beginning of this century [that is, in the last sixteen years] fifteen countries have either adopted or greatly extended a land settlement policy which aims to give settlers homes at the least possible cost and also to finance the settler who is a good moral risk, so as to enable any one, who is frugal, industrious, and ambitious, to own a home. These countries are Great Britain, Denmark, Norway, Sweden, Germany, Russia, Austria, Italy, the six Australian states, New Zealand, British and German South Africa, Brazil, Venezuela, and Uruguay."

The United States is not among the nations listed in the foregoing paragraph. That omission is of grave significance in this period of high costs of food, unrest of farmers in the West, congestion of immigrant farmers in industrial centres in the East, increase of tenantry on the land the country over, and world shortage of food production.

This quotation is taken from the readable, informing, and constructive "Report of the Commission on Land Colonization and Rural Credits of the State of California." It is the fruit of a year's investigations, in which the Commission was aided in the taking of testimony and the analysis of facts by the Commonwealth Club of California and by the University of California. The report is a detailed picture of the business and social sides of rural life, an analysis of the causes of its failure, and a statement of the remedy. It points out that the Federal Farm Loan Act does not fully meet the situation because its benefits are "restricted to farmers who can give first mortgage security on land worth double the amount of the loan," and adds that "in order to enable tenant farmers to become farm owners, or in order to give adequate assistance to colonists of small capital, a separate credit system based in some measure on the character of the borrower must be provided."

The Commission found that the commonest cause of failure of settlers was inadequate capital: "We have not found a single settler who, bringing with him only the limited capital accepted by state systems in other countries, has been able to pay for his land in the time agreed upon in his contract." The Commission cites two examples that could be paralleled by the thousands all over the country:

"One [settler] with a capital of $1,575 paid $1,500 of it as a first payment on a farm costing $7,500. He had $75 left with which to build a house, buy a team and farm equipment, and pay living expenses until a crop could be grown." "Another landed in one of the settlements with a wife, four small children, and $1,100. The day he arrived he turned over $1,000 of his $1,100 as a one-fifth payment on forty acres of land. At night he had $100 in cash and a debt of $4,000. He faced a large expenditure for house, team, tools, preparation of the soil for cultivation, all of which must be made before he could earn a living from the land."

What is the remedy? The Commission finds it to be in the adaptation of a system of State-aided or State-guided purchase, the essential elements of which are to be found in all the systems worked out by foreign countries. ["State aid" does not mean that the system costs the Government and the general taxpayer any money. In Australia, the system, though involving more than 100 million dollars, has paid the Government a large cash profit]:

"*Small initial payments.* The first of these essentials is a provision for enabling farmers to enter into possession of land with only a nominal payment, thus leaving the greater part of their capital available to pay for improvements and equipment.

"*Organized construction of farm improvements.* The second is the creation

of an organization, either state or private, to make the necessary improvements, such as houses, stables, etc., leveling and ditching irrigated land, and providing practical superintendence over the farming operations of beginners to prevent costly delays and mistakes.

"*Long-time payments for land and improvements.* The third is making the period of payments long enough to enable the money to be earned out of the soil, and having the payments amortized, that is, in small amounts paid annually or semiannually rather than in a lump sum; also securing for the settler, usually through the use of the State's credit, loans of money needed for improvements at low rates of interest.

"*Practical advice and supervision for beginners.* The fourth is the employment of capable business men fully informed regarding prices of farm equipment and farming operations in the locality to give advice to inexperienced beginners or farmers from other sections of the country who do not know what crops to plant or when or how they should be cultivated."

What are the results of the application of these principles?

"*Ireland.* In Ireland 9,000,000 acres of land have been purchased by the British Government since 1903. After the purchase, this land was subdivided into small farms on which the necessary houses and other improvements were erected. These ready-made farms were then sold, mainly to former tenants, at an average price of about $50 an acre, the buyer to have sixty-eight years in which to pay for the farm and the improvements, with $3\frac{1}{2}$ per cent. interest on deferred payments. For many years Ireland was one of the most distressed countries in the world. Within a decade the wretched and more or less lawbreaking farm peasant has been converted into an industrious, progressive, and law-abiding landed proprietor.

"*Russia.* In no other country has systematic state colonization reached the magnitude it has attained in recent years in Russia. Between 1906 and 1910 the Peasants' Land Bank, which has an annual Government subsidy of $2,575,000, bought, subdivided, and sold to settlers 4,041,789 acres for $92,700,000, or about $23 an acre. The maximum size of these farms is fifty-seven acres. Loans are made up to 90 per cent. of the value of the land, with interest at 4 per cent. and a payment period varying from thirteen to fifty-five years. This is in addition to the immense colonization operations of the Government in Siberia where, as stated in Herrick's [Mr. Myron T. Herrick, former American Ambassador to France] work on rural credits, 'hundreds upon hundreds of thousands of Russian farmers have acquired millions of acres, worth billions of dollars, by means of money and credit facilities supplied by the Government.' It is reported that Russia is now making preparations to inaugurate, at the close of the present war, the most liberal and comprehensive system of State aid in land settlement yet undertaken by any country."

At this point, if not before, the reader may be expected to object that "American farmers are different; they are too independent and too individualistic to be profited that way." But the fact is that one of the most extensive and most successful of these systems is in operation in Australia, which is more nearly like the United States in government and people than any other country save Canada.

"*Australia.* Between 1901 and 1914 the six Australian states purchased and subdivided 3,056,957 acres, for which $55,243,125 were paid, or about $18 an acre. In all these states provisions were made to assist settlers to build homes and effect improvements needed to bring the land fully and promptly under cultivation. In the five-year period from 1909 to 1914 these six states lent the farmers, to make improvements and buy equipment, $68,029,500. *This has been done without any cost to the general taxpayer,* as the interest paid by the farmers was greater than the interest paid by the State; and the farmers have met both payments of principal and interest, so that there has been an accumulated profit of $1,233,370."

The whole of the California Commission's report is fascinating reading. Some of it concerns only California, because

conditions there are extreme; but most of it applies equally to New England, the South, and the Mississippi Valley. And it contains much suggestive comment on the broad subject of land in its relation to the public welfare—besides containing much practical information for any man who is thinking of buying his first farm or of selling his old farm to buy a new one. It throws a bright light on some causes of the high cost of living, on the political disquiet of the farming states, and on the state of agricultural preparedness for war in this country. The war in Europe has now got to a point where it is largely a question of the side that has the biggest bread basket. We should confront the same situation in any prolonged war.

WHAT ABOUT YOUR EYES?

THE HEALTH OF THE EYES MAY BE THE CAUSE OR THE RESULT OF GENERAL ILL HEALTH—THE DIFFERENCE BETWEEN AN OCULIST, AN OPTICIAN, AND AN OPTOMETRIST—FACTS ABOUT GLASSES, ILLUMINATION, ETC.

BY

CHARLES PHELPS CUSHING

TO MAKE sure that this series of articles shall be authoritative, the WORLD'S WORK has arranged to have them reviewed and approved by the Life Extension Institute before they are published.

The Life Extension Institute was organized by well-known scientists, publicists, and business men as a semi-philanthropic enterprise to disseminate the knowledge of healthful living among the people. Ex-President Taft is president of the Board of Directors, and its professional advisers include some of America's most distinguished physicians and surgeons, as well as the more prominent educators. The Institute's approval of these articles, therefore, assures their scientific character.

EVERY competent oculist is a collector of cross-sections of the daily lives of his patients. This is not out of idle curiosity. The oculist is a physician (an M. D.), and it is as much his business to prescribe for errors in his patients' ways of living as for errors of ocular focus. "Defective vision may be a sign of ill health. Defective vision may be a cause of ill health." Keep this in mind if it ever occurs to you that the medical man to whom you apply for a prescription for your overstrained eyes appears to be examining you too closely upon personal matters that seem far removed from wall charts and lenses. The state of your digestion and your temper, what you do with your evenings, what you eat and drink and smoke, how often you go to the "movies," the kind of light you have over your desk—any or all of these points (and others) may furnish important information to the man who is prescribing for your eyes.

Stand by for a few moments and have a look at the sort of thing that happens in oculists' offices every day. Case: a young business man with overstrained eyes. Questions and answers in the course of the consultation show that the applicant's daily schedule runs somewhat as follows:

A hasty breakfast of coffee and rolls. Street car to the office, reading a newspaper on the way. At his desk from 9 until 12:30, working hard and fast. Luncheon of roast beef, coffee, and apple pie, followed by a cigar. Back to the office shortly after 1, and hard at work again till 5 or 5:30. Home on a street car, reading another paper. Dinner at 6 or a little later, opened with a cocktail for an appetizer; *pièce de résistance* usually a steak. Mashed potatoes. White bread. As the steak is large and filling (and costly)

he rarely orders any vegetable side dishes. Likes a little beer or wine with his dinner, but is "a temperate man" and rarely takes more than a glass or two. For dessert, pie or French pastry or ice cream, followed with demitasse and another cigar. Often does a little work in the evening. Otherwise goes to a "show"—"movies" preferred. Occasionally a card party. Usually smokes little at the office but makes up for lost time in the evening. Before going to bed takes a laxative, for of late he has a growing tendency toward constipation. Turns in at about 11:30. Often has difficulty in getting to sleep right away; little noises disturb him greatly, and he lies awake thinking about affairs at the office. Wonders sometimes if he hasn't been smoking too much and if he oughtn't to cut out his after-dinner coffee. Always finds it an effort to get up in the morning. Confesses to a tendency toward "nerves" and quick temper, probably due, he hazards, to the pressure of work and "office politics." Hasn't a moment to spare from his work; in fact, he put off this appointment with the oculist until the last possible moment.

Glasses are required. The oculist orders them. But that is only part of the prescription; he then goes on to explain that the patient's vision will be further improved—perhaps greatly improved—by making certain changes in diet, cutting down on stimulants and tobacco, giving the eyes more rest (particularly in the evenings), and perhaps taking some setting-up exercises every morning and a leisurely walk just before bed-time.

DIET AND EYE-STRAIN

"All this," the doctor explains, "is because in such a case as yours the general health and the health of the eyes are likely to exist in close association. In a highly-strung physical organization the eyes may, in a reflex way, affect the digestive tract, cause 'nerves' and sleeplessness. In the same reflex way constipation or indigestion or sleeplessness or 'nerves' may affect the eyesight. If you were a husky longshoreman, getting lots of exercise and rarely putting your eyes to any strain, a defect in vision might cause you no annoyance. That same amount of defect in the vision of a sensitive sedentary type might produce a nervous breakdown. You are the sort who have to be careful.

"You may wonder why I should advise a man who is not ill and who came here to be treated for 'nothing but eye-strain' to revise his diet. I say it would be better for you to limit yourself to not more than one order of meat a day, to substitute graham bread for white, baked potatoes for mashed, to eat more fruit and vegetables, less pastries, and drink less coffee. What has white bread to do with your eyes?

"Just this—it is one of a number of dietary causes of your tendency toward constipation. Adopt the right diet and you can dispense with laxatives. Your eyes will be early beneficiaries from the new régime. You know for yourself how quickly gastro-intestinal conditions affect them, for when you have 'bilious attacks' they ache and are heavy and spots float before them. Auto-intoxication from derangement of the stomach and the bowels sometimes affects the eyes very seriously.

THE EFFECTS OF STIMULANTS

"Possibly you think I am quibbling over a small point again when I advise you, 'a temperate man,' to drink less stimulants. That is because you probably do not realize that the eyes, like the heart, have to pay in the costs of overstimulation. To a certain degree you are troubled with 'nerves' and sleeplessness, and your digestion is not always of the best. The stimulants you are drinking aggravate such conditions, and the eyes suffer along with the rest of your body. Moreover, in some persons such poisons have a more direct effect upon the eyes. A single large dose of whiskey has been known to produce temporary blindness. In the same fashion excessive drinking of tea or coffee has been found directly responsible for impairments of vision—reductions of one twentieth to one fifth.

"Now, as you know, one man's meat is another's poison. Stimulants may have very little apparent effect upon your particular pair of eyes—or they may have great effect. So with tobacco. These

narcotics impair some men's eyesight. They sometimes even produce blindness. The fact that you are 'temperate' in your drinking and smoking is no guarantee that narcotics are doing your eyes no direct harm."

Point by point the oculist went on to show how the things that make for right living affect the health of the eyes. He was doing what hundreds of other oculists do every day. The case for which he was prescribing is here described at length because it is a common one.

WHAT AN OCULIST IS

When the incident was told to Dr. Eugene L. Fisk, of the Life Extension Institute, his first brief comment was, "Typical!" Then from a cabinet he drew out a bulletin of the Institute upon "The Eyes and Health," and pointed at the opening sentences:

> Defective vision may be a sign of ill health.
>
> Defective vision may be a *cause* of ill health.
>
> When there is trouble with the eyes an oculist should be consulted.
>
> An *oculist* is a physician who makes a specialty of the eye.
>
> An *optician* is one, not a physician, who deals in optical instruments, such as eye-glasses.
>
> An *optometrist* is one, not a physician, trained to examine the eye as an optical instrument and determine its optical defects. An optometrist should be competent to determine such defects.
>
> Neither an optometrist nor an optician is permitted under the law to consider the eye as an organ and diagnose its possible diseased conditions."

GLASSES NOT ALWAYS ESSENTIAL

"This is a primer-like introduction," the doctor remarked, "but popular notions about such matters are so hazy that we feel it our duty to make every point absolutely clear. Why should you consult an oculist when something goes wrong with your eyes? Because he can tell you *all* that is wrong—the total meaning of the defect. The optometrist, who is not a physician, can examine the eye only for its efficiency as an instrument.

"The business man you have been describing may have been rather surprised to find that the prescription the oculist gave him included something besides a pair of spectacles. But glasses are sometimes the least important part of the oculist's order—sometimes, in fact, are not required at all. I have known cases where the right glass was all that was needed and the wearers so improved in health that they gained ten pounds in one month. In other cases the fault affecting the eye had its seat elsewhere—at the roots of a tooth, in the kidneys, in habits of diet, in the ventilation of a paint shop, in a hair dye, in a disease acquired while sowing wild oats. The oculist often renders valuable service by detecting in an applicant the first signs of Bright's disease or arterial trouble. Such service is quite out of the province of the optometrist.

"Go to an oculist—and don't wait until the last minute to do so. Though our eyesight is precious to us beyond appraisal, something in human nature makes us put off our eyes until the last. This trait, I may as well be frank to say, is not unknown even among physicians. Few general practitioners have a sight-testing chart in their offices; and when they are conducting an investigation for physical 'leaks', they are likely to put off the eyes until the last and perhaps forget them altogether. Of course, if the patient complains of a certain sort of headache, the doctor will immediately think of the possibility of eye-strain. In such an instance or in one where the patient himself suspects the existence of eye-strain, the doctor will see that an optical examination is made. But often even the simplest kinds of tests are omitted—tests that any doctor could conduct with a chart on the wall of his office.

THE FUNCTION OF GLASSES

"This is unfortunate, for defects of the eye are common, and proper glasses to correct them make not only for the individual's comfort but also are very likely to improve his general health. Among the applicants examined by the Life Extension Institute more than 30 per cent. have uncorrected errors of vision. Statistics from the public schools show that among our 20,000,000 enrolment 'at least 5,000,000 children suffer from eye diseases or defects

which seriously impair their school progress.'

"What makes it particularly important for *every one* to have his eyes examined is the fact that a person's own visual sensations are not always safe guides. Farsightedness, for example, is something about which many people like to boast. Yet it is often a sign not of visual perfection but of an imperfection; and in an office, bent over papers all day, the farsighted man may be suffering from eyestrain and not know what ails him. Certain men who can see better without glasses than with them find it to their profit to wear lenses to relieve an eyestrain. Glasses, you must understand, do more than simply enlarge, like a reading glass, the object which you happen to be looking at. A reading glass may only magnify the defect and do more harm than good.

"Apparently, even such simple facts as these are not generally known. Indeed, a great many men who are well enough informed on other topics do not know the first principles of how to conserve their eyesight. They may be conscious of eye-strain and yet unconsciously go right on doing many things to increase that strain. Things such as these—reading a newspaper on a jiggly street car, working with a light directly behind them or directly in their faces, reading or working in too bright a glare or in a dim or flickering illumination. They do not realize that they might well limit their allowance of moving pictures. They do not know the harm in too brilliant a desk light. They buy worthless patent nostrums for the eye and have a positive dread about adopting glasses. The price they pay for all this often is extremely dear. It ranges from constant physical discomfort to loss of sight."

Several of the points brought up by Dr. Fisk's remarks deserve further discussion. One of the most important of these topics is lighting.

THE LIGHT TO WORK IN

"The best light," observes a bulletin of the Institute, "is an indirect, diffused light, of sufficient strength to make the letters on the page stand out black and clear, and of uniform distinctness. If you have a desk light, note the intense reflection from the various articles on the desk, especially white or metallic surfaces. This is a constant source of eye-strain. Various papers on the desk will be found to be of varying legibility, some of the writing illegible unless brought directly under the gaze. If a diffused, indirect light is used, either reflected from the ceiling or partly reflected and partly direct through ground-glass surfaces, documents and papers on any part of the desk will be read with equal facility. There are then no dazzling reflections. Exposure to excessively brilliant light will sometimes bring on inflammation of the eyes, or even temporary blindness, as occurs in snow-blindness."

THE HIGH COST OF POOR LIGHTING

To this Dr. Fisk adds that, if he had his way about it, all incandescent light bulbs in offices and factories would be softened by ground-glass or frosted surfaces to protect the eyes from the sharp light of the glowing wires. Indirect systems, where the light is directed upon the ceiling instead of downward, are admirable, he holds, but care should be taken to see that the light is strong enough. This sort of lighting requires more candle-power than a direct system. For further information on this point Dr. Fisk recommends business men to look up a little pamphlet published by the American Medical Association, in Chicago, on "The Relation of Illumination to Visual Efficiency." It is one of an exceedingly valuable and interesting series on "Conservation of Vision." Some of these pamphlets are concerned with such practical topics as Schoolchildren's Eyes, Care of the Eyes, Accidents, Wearing Glasses, Eye-strain, and discussions of the effects upon the eye from whiskey, tobacco, wood alcohol, and various drugs (The pamphlets cost only five cents, postpaid). All are written by medical authorities.

Some of the hints in the paper on illumination are so important that a passage or two deserves quotation. Here is what the author, Dr. Ellice M. Alger, has to say about the cost of bad lighting:

"Even when estimated by its actual cost

in dollars and cents, bad lighting is often more expensive than good, but from the standpoint of efficiency there is no comparison. Bad lighting undoubtedly causes unnecessary strain of the eyes and consequent premature muscular fatigue; it compels closer and more constant attention to the details of work, so that tasks which should be done almost automatically and without mental effort are done consciously. Under such circumstances the output of each individual is manifestly less than it should be, there is a larger percentage of mistakes and material spoiled, and the number of accidents, large and small, is vastly increased. Even under the best of conditions, the extreme subdivision of factory work, with its consequent monotony, largely destroys the pleasure of work, but bad eyes and poor lighting and long hours are important factors in industrial discontent of the day."

ADVANTAGES OF A NORTH LIGHT

Concerning daylight illumination, Dr. Alger remarks that a good north light, diffused, is the best, causes a minimum of shadow, is subject to no rapid changes in intensity, and in the matter of color values is the universal standard. "It is least trying to the eyes," he continues, "and allows a maximum sharpness with a minimum of fatigue. The best lighted room would be one lighted on the principle of a photograph gallery. Where land is cheap and a one-story building is possible, this principle can be applied in the so-called saw-tooth type of construction now used in so many factories, the entire roof consisting of rows of skylights facing toward the north. In buildings of more than one story the use of north light alone is impracticable, since all the rooms cannot face toward the north, or other buildings may interfere with the light, while, unless the room itself be small or high-posted, the light would not reach far enough into the room. This particular difficulty can be largely overcome by the use of prism glass in the windows, which throws a light much farther back into the room. Windows should be as large as possible and on only two adjoining sides of the room. This permits the arrangement of desks and work so that each person may get his light over his left shoulder, which is the accepted position of greatest efficiency. No one should be compelled to sit steadily facing a window or light of any kind. A north light is practically never bright enough to require reduction, but when the windows face in other directions the intensity of the light will vary widely with the position of the sun, and arrangements must be made for diffusing and modifying the direct sunlight during some portion of the day by the use of frosted glass or the interposition of thin shades of cloth, which diffuse and soften the light."

Dr. Alger contends that electric lighting is "still in its infancy." Like Dr. Fisk he has a good word to say for indirect lighting and a warning against naked incandescent bulbs—an illumination particularly tiring to the eye. "Globes which show the outline of the lamp filament," he holds, "are only partly effective." Here is his suggestion about lighting an office: "It would be perfectly possible to have an individual light on each desk so controlled by an opaque reflector that it lighted the desk properly and was at the same time prevented from shining into any one's eyes. The same effect is secured, for all practical purposes, by having lights scattered over the ceiling or suspended from it, each enclosed in a diffusing globe of some pattern. The amount of light on each desk should rarely be greater than three candle-power, nor less than two. As a rule, wall brackets are not advisable, unless they can be placed high up. The so-called 'indirect system' aims to secure the same diffusion of light by having the units so disposed that the entire light falls first on the ceilings and walls and is thence reflected into the room. In this way, if the surfaces are rough, the light is completely diffused, while its color is modified as desired by tinting the wall surfaces. Indirect lighting is a pleasant way of lighting a large room where a comparatively low illumination is called for. In a school room, where plenty of light is needed, it is comparatively expensive, since only a small part of the emitted light reaches the desks, the rest being expended in lighting the upper part of the room or absorbed by the reflecting surfaces. Their

color is an important detail, since even light-colored surfaces seldom reflect more than half the light, while with dark ones the amount may fall to 10 or 15 per cent."

Another valuable pamphlet of the Conservation of Vision series is by Dr. Walter B. Lancaster on "Wearing Glasses." One of the first points the author makes is that eye-strain may exist in cases where the sight is actually better than normal, and that such persons need glasses quite as much as those who wear them to "see better."

VANITY'S "OBJECTIONS" TO GLASSES

Dr. Lancaster does most worthy service in disposing of one of the popular objections to wearing glasses, namely, that wearing glasses makes one look old. This was true, he admits, in the days when they were worn only to help poor sight, and chiefly by the elderly. "We have changed all that. Now, a very large percentage of wearers of spectacles are children, and the wearing of spectacles is no longer a mark of advanced age. It is not a sufficient excuse for a lady to say that glasses would make her look old. Moreover, wearing glasses is one of the best preservers of a youthful appearance. This is because prolonged eye-strain causes wrinkles to appear prematurely and gives the countenance a strained, anxious, tired, drawn, cross look, which is very characteristic and is far more to be avoided, from the point of view of appearance, than the slight disfigurement of glasses. Indeed, so far from being unbecoming, there are some types of face to which glasses just add the finishing touch!" After indicating some of the mistakes in the way glasses are worn and adjusted, he gives some hints about buying them, getting used to them, and taking care of them. Dr. Lancaster's paper is all written in non-technical language, and straight to the practical point.

Another objection often made against glasses is treated in a paper on "Accidents" by Dr. E. C. Ellett. The danger that spectacle glass will injure the eye is comparatively small, he holds, and he even advocates wearing glasses as a protection when you go shooting. "We frequently," he says, "see people who wear glasses meet with accidents in which the glasses are broken, but seldom is the eye itself hurt by the fragments. Indeed, if the glasses are provided with rims they are a protection rather than otherwise."

In another pamphlet of the series Dr. Harold Gifford hammers hard on this same point, talking from an extended experience: "The question of the value of protective glasses is one which deserves to be impressed upon all classes of people. Many people meet the recommendation that protective glasses should be worn with the counter objection that they are themselves a source of danger, on account of the possibility of their being broken and cutting the eye. This is, of course, a possibility and such accidents occasionally occur, but the insignificance of this danger in proportion to the safety they confer can easily be demonstrated. In thirty years' experience, during which the writer has seen in the neighborhood of 2,000 serious accidental injuries to the eye, he has seen only three injuries of any kind caused by broken spectacles. In none of these was the eyesight very seriously injured, while the vast majority of other injuries to the eye would have been entirely prevented by wearing glasses. . . . Every day in this country some dozens, or more probably hundreds, of children lose the sight of one or both eyes through injuries, of which 99 per cent. would have been prevented if the victims had been wearing glasses; and mothers whose hearts are grieved by the counsel of the oculist that their children ought to wear glasses for some defect of vision or refraction may well take comfort from the thought that their little ones are much less likely to suffer accidental loss of sight than other, apparently less favored, ones."

THE FACTS OF THE NORTHERN SECURITIES CASE

THE REASONS WHICH INSPIRED THE FORMATION OF THE FAMOUS HOLDING COMPANY AND THE STORY OF ITS DISSOLUTION

BY

JOSEPH GILPIN PYLE

[This article, like those published earlier, is compiled from "The Life of James J. Hill," the authorized biography which is shortly to be published in two volumes in its complete form as an elaborate and connected narrative of the life of the great Empire Builder.]

JUST before Christmas, 1901, Mr. Hill returned from New York, to find himself bitterly attacked in his own state in the discussion of the formation of the Northern Securities Company. For the only time in his life, so far as is known, he prepared and signed a statement for publication dealing with his own acts and purposes. It covers the ground of all the transactions briefly. The copy is taken from the St. Paul *Globe* of December 22, 1901. The fact that Mr. Hill owned at that time all the stock of this newspaper is a guarantee that it appeared exactly as he wrote it:

"I have been absent from Minnesota for more than two months, and during that time there has arisen a wide discussion throughout the state of what has been generally called a consolidation or a merger of the Northern Pacific and Great Northern railways, and in this discussion statements have been made which are so widely different from the facts that I feel called upon to make a conservative statement of just what has been done in the past and what will be done in the future.

"When the Northern Pacific failed and the banking house of J. P. Morgan & Company reorganized it, myself and friends were holders of a large amount of that company's securities. After the reorganization was completed we bought about twenty-six millions of Northern Pacific stock, both common and preferred. Some of this stock was afterward sold by individuals, but a large amount has been held from that time to the present.

"About a year ago the Union Pacific Company bought the Huntington and other interests in the Northern Pacific and at the same time made an effort to buy the control of the Chicago, Burlington & Quincy.

"With these lines in the hands of the Union Pacific interests, both the Northern Pacific and Great Northern would be largely shut out of the states of Nebraska, Kansas, Missouri, South Dakota, Iowa, Illinois, and Wisconsin, except by using other lines of railway, some of which were in the market for sale and might at any time pass under the control of or be combined with the Union Pacific interests. We then, with the Northern Pacific, made proposals to the directors of the Burlington to buy their entire property. When this transaction was about being closed the people who represented the Union Pacific Company, and who had previously tried to buy the Burlington, asked to be allowed to share with us in the purchase of that Company; this proposal we refused for the reason that it would defeat our object in buying the Burlington, and, further, it was against the law of several of the states in which the largest mileage of the Burlington was located.

"At that time, against the opposition of the more southerly lines, both the Northern Pacific and Great Northern had put into effect a low colonization rate and were carrying daily thousands of people into the Northwest; many of whom were coming from Kansas and Nebraska along the lines of the Union Pacific. This move-

ment was at its height in the month of April, and after we had closed the purchase of the Burlington, the Union Pacific people undertook the boldest effort that ever was made in this country and bought over sixty millions of the stock of the Northern Pacific in the markets of Europe and the United States. I was in New York at the time, and after Messrs. Morgan & Company were aware of the action of the Union Pacific people it was found that together we held about twenty-six millions of Northern Pacific common stock; and, inasmuch as the common stock, by right of a contract made with the preferred stockholders when the company was reorganized and the stock issued, had the privilege of paying off the preferred stock at par on the first day of January in any year until 1917, Messrs. Morgan & Company then bought in London and New York about sixteen millions of the common stock of the Northern Pacific; at the same time the Union Pacific interests, having already so large an investment, bid the stock up until there was the largest stock corner ever known; the common stock in three or four days went up to one thousand dollars per share.

"I explained to my friends how, with control of the Northern Pacific, the Union Pacific would control the entire Northwest and the West from Mexico to the Canadian line, except for the Great Northern. So great was the effort to get this control that one of my friends in London, who owned two millions of Northern Pacific common, was offered and refused fourteen million dollars for his stock. The result was that Messrs. Morgan & Company and ourselves owned forty-two out of eighty millions of the Northern Pacific common, with the privilege of paying off the seventy-five millions of Northern Pacific preferred. The Union Pacific people owned thirty-seven millions of the common and about forty-two millions of the preferred, which was a clear majority of all the stock of the Northern Pacific, and claimed the exclusive control of the Northern Pacific Railway and through that ownership a control of one half the Burlington. When it was known that these preferred shares could and would be paid off before the annual election, mutual negotiations resulted in Mr. Morgan giving them a representative in the Northern Pacific board. At the same time I was elected a member of the Northern Pacific board. When I was advised of my election I notified them that I could not legally act as a director of the Northern Pacific and Great Northern at the same time, and I resigned after the first meeting of the board.

THE NORTHERN SECURITIES COMPANY

"Several of the gentlemen who have long been interested in the Great Northern Railway and its predecessor, the St. Paul, Minneapolis & Manitoba Company, and who have always been among its largest shareholders, but not the holders of a majority of its stock, whose ages are from seventy to eighty-six years, have desired to combine their individual holdings in corporate form and in that way secure permanent protection for their interests and a continuation of the policy and management which had done so much for the development of the Northwest and the enhancement of their own property in the Northwest and elsewhere. Out of this desire has grown the Northern Securities Company.

"It became necessary (in order to prevent the Northern Pacific from passing under the control of the Union Pacific interests and with it the joint control of the Burlington) to pay off the seventy-five millions of Northern Pacific preferred. The enormous amount of cash required for this purpose from a comparatively small number of men made it necessary for them to act together in a large and permanent manner, through the medium of a corporation, and the Northern Securities Company afforded them the means of accomplishing this object without the necessity of creating a separate company to finance the transaction for the Northern Pacific; while, at the same time, the credit of the Northern Securities Company would be much stronger, as it would also hold a considerable amount of Great Northern and other securities.

"The Northern Securities Company is organized to deal in high-class securities,

to hold the same for the benefit of its shareholders, and to advance the interests of the corporations whose securities it owns. Its powers do not include the operation of railways, banking, mining, nor the buying or selling of securities or properties for others on commission; it is purely an investment company and the object of its creation was simply to enable those who hold its stock to continue their respective interests in association together and to prevent such interests from being scattered by death or otherwise; to provide against such attacks as had been made upon the Northern Pacific by a rival and competing interest, whose main investment was hundreds of miles from the Northwest and whose only object in buying control of the Northern Pacific was to benefit their Southern properties by restraining the growth of the country between Lake Superior and Puget Sound, and by turning away from the Northern lines the enormous Oriental traffic which must follow the placing on the Pacific Ocean of the largest ships in the world. . . .

"No merger or consolidation of the Northern Pacific and Great Northern is contemplated. Each company will be operated separately in the future, as in the past.

"I greatly dislike to discuss my business in the newspapers, but during my absence an attack has been made upon myself and friends which has been persistently supported by both political and rival interests. All I ask is fair play, and let time determine whether the public will be benefited or injured by what we have done and will continue to do."

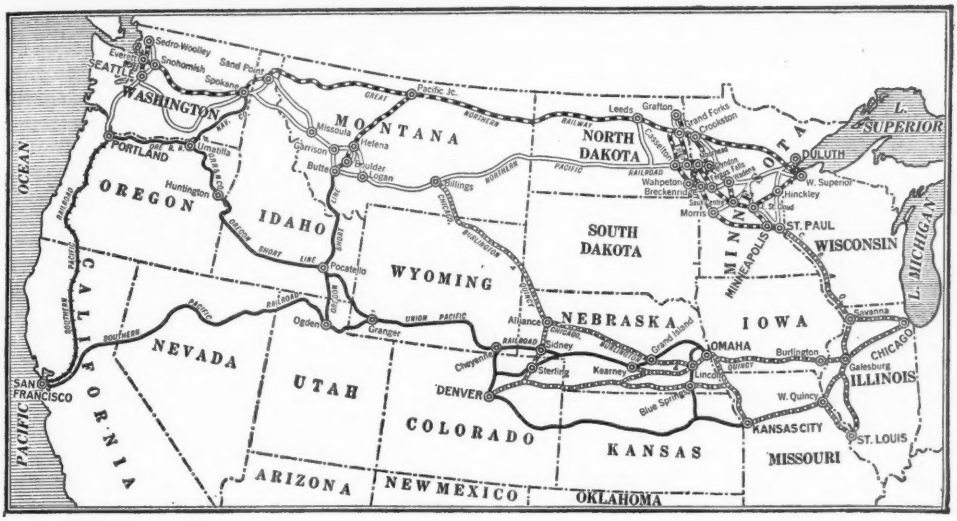
JAMES J. HILL.

CONCERN FOR THE FUTURE

Confidence in the security of any railroad had received a rude shock. The men whose property had so narrowly escaped what they regarded as destruction were not minded ever again to run a similar risk. They did not wish themselves or their successors to have to make another fight like that of the struggle for control of Northern Pacific. Both sides had had a warning. Each would always have to stand on guard. But who could answer for the future, when large holdings should be broken up by the changes incident to human life? Some of these men were more than eighty years old. All of them wanted "peace in their time." Mr. Hill had talked of his idea of a holding company to Mr. Morgan and Mr. Kennedy. Mr. Morgan said later that it was a thing of Mr. Hill's planning. Mr. Hill said so himself. His original thought had been to erect such a concern for his own system and its subsidiaries. The consolidation of these which took place in 1907 was already become a necessity. Long before the Northern Securities was formed, this less inclusive proposition had occupied a good deal of his thought. Now circumstances hastened the maturity of the project and compelled an enlargement of its scope. It appeared to all those interested in recent controversies that the only permanent safeguard of the independent existence of these great properties and of a successful, because harmonious, conduct of their business was a sort of tribunal of ownership, where all would have representation and power; where their differences might be arbitrated and their common welfare assured.

Mr. Morgan said that this form of holding company presented itself to him as practical and desirable only after the 9th of May, 1901. "My idea was, I can't live forever, and J. P. Morgan & Company may be dissolved." This fell into step with the anxiety that had been pressing upon Mr. Hill for some years about the future of the Great Northern. So all these more or less nebulous ideas drew together and coalesced in one solid purpose. A future possibility became a present necessity. With these men, to perceive that something ought to be done was to go ahead and do it. The definite plan, as announced to the stockholders, was matured about the 1st of November, 1901. Of course, the exact form that it should take had been, before that, the subject of exhaustive investigation and minute legal scrutiny of advantages and dangers. It was intended as a purely defensive measure.

When it was determined, soon after the agreement of May 31, 1901, that settled the controversy over Northern Pacific, to



RAILROADS INVOLVED IN THE NORTHERN SECURITIES CORPORATION
The object of its organization, according to James J. Hill, was to secure permanent protection for a group of aged stockholders

form such a company, some of the ablest lawyers in the country were set to work on the preliminaries. From the beginning, the essentials of it were agreed upon without serious difference of opinion. The plan, Mr. Hill said, was practically determined by Mr. Kennedy, Mr. George Baker, Mr. James, Mr. Thorne, Mr. Clough, Mr. Perkins, and himself. Mr. Hill has given in his own words the explanation of the general lines followed: "We were particularly anxious to put a majority of that stock where it could not be raided again as it had been. We wanted to put it in a corporation that was not a railroad company—a company that would hold it as an investment, and the larger the company the more difficult it would be to secure a majority of it. Then, again, a reason why we preferred an investment company: railroad charters, I think I may say almost entirely, are drawn or granted on terms that do not permit railroad companies to buy the shares or own the shares of investment companies. Railway companies, under certain conditions, can buy the shares of other railways, as a means of consolidation, or they might buy the shares of a road that they would otherwise build. We were advised that we would be safer with the shares held by an investment company, the stock of which could only be held by individuals or by corporations that were not railway companies, and to that extent we would be more free from such raids by interests that were anxious to destroy or restrict the growth of this country—such raids as had been made by the Union Pacific interest, so-called."

MORGAN'S CONFIDENCE IN HILL

For the sake of clearness, let it be repeated that the original idea of making a holding company had no reference to the Northern Pacific at all. It was entertained by Mr. Hill before the reorganization of the Northern Pacific. Now, the whole position and all the elements of the problem were changed. In view of the relations established with Northern Pacific and their joint interest in the Burlington, such a holding concern for the Great Northern alone would have been absurd. All the closely allied interests must join. They desired to. In the consultations held, Mr. Perkins represented the Morgan interests. Referring to this, Mr. Morgan not only cleared the air of gossip about internal machinations, but paid to Mr. Hill the highest tribute he could give. "I would have given him all my Great Northern stock. He could have done what he liked with that, because I had confidence

in him and he had confidence in me. It is not a coterie or anything of that kind."

On the 13th of November, 1901, the Northern Securities Company was incorporated. The charter was taken out in New Jersey, whose laws were supposed to be most friendly to this kind of undertaking. It differed from that of most other great corporations formed in this epoch particularly in the fact that its powers were severely limited. The custom was to provide against every contingency by authorizing each of the big, new corporations now being spawned so rapidly to conduct practically any business in which it might conceivably wish to engage. The charter of the Northern Securities confined its activity "to the acquisition of valuable paper held by domestic and foreign corporations, exercising the rights of property over the same, aiding corporations whose paper is thus held, and acquiring and holding the necessary real and personal property." Its authorized capital stock was $400,000,000. At first a much smaller capitalization was contemplated. But neither Mr. Hill nor Mr. Morgan was willing that any one should ever be able to accuse him of sharing in a profitable venture from which others were excluded. Mr. Hill had a lifelong reputation for working for his stockholders all the time. If there was any conflict of interests, his must suffer rather than theirs. But if only those were admitted whose age and long connection with the company had inspired the project, and if it were a financial success, people would not be lacking to stigmatize it as the plan of a chosen few on the inside to make some money for themselves. He said: "I had the feeling that we would give each shareholder the opportunity to come in at the price we put our own in, if he desired. If he preferred to stay out, that was his privilege." Mr. Morgan took the same position. Adherence to that principle necessitated a capital stock at least as large as that of the Great Northern and the Northern Pacific combined. The authorized share capital of the two was at this time $280,000,000. Of course, an exchange at above par would raise this limit. Other interests also would want to be admitted from time to time. About 76 per cent. of Great Northern stock was exchanged for the new security at the rate of $180 for each $100 turned in. Mr. Hill had suggested this basis, which was approved by all. About 96 per cent. of Northern Pacific came in on the basis of $115 for $100. The Union Pacific people were admitted, for a lasting harmony was desired, and surrendered to the Northern Securities the holdings of Northern Pacific which they had acquired in the fight for possession, receiving in exchange about $82,500,000 of its stock. The first board of directors consisted of fifteen men. Six represented Northern Pacific interests, four Great Northern, three Union Pacific, and two were what might be called "at large." The presidency was unanimously conferred upon Mr. Hill.

MINNESOTA BRINGS SUIT

On January 7, 1902, the state of Minnesota attacked the company in the Supreme Court of the United States. Denied there permission to file a bill of complaint, it brought suit in the state court. In the meantime the Federal Interstate Commerce Commission had, at a meeting on December 20, 1901, adopted a resolution calling for an investigation by it into "consolidation and combinations of carriers," including "the community of interest" plan; and, on February 19, 1902, the Attorney-General of the United States announced that, complying with a previous request of President Roosevelt, he had given it as his opinion that the "merger," as the Northern Securities was called, violated the provisions of the Sherman Act of 1890. Thereupon, on March 10th, suit was brought in the United States Circuit Court of St. Paul against the Northern Securities, Great Northern, and Northern Pacific.

These two cases resulted in two different decisions by Circuit courts, before the Supreme Court of the United States was reached. The first, which was rendered by a tribunal made up of four Circuit judges, found that "the Securities Company accomplishes the object which Congress has declared illegal perhaps more effectually than other forms of combina-

tion generally known in 1890 when the Anti-Trust Law was passed." It said that, although the motives which inspired the combination might have been "wholly laudable and unselfish," although it was "the initial and the necessary step in the accomplishment of great designs," the only question before the court was whether or not it constituted a combination having power to "suppress competition between two or more competing and parallel lines of railroad engaged in interstate commerce." This question the judges answered in the affirmative. The Northern Securities was enjoined from voting stock, acquiring additional stock, paying dividends, or exercising corporate control. The return of stock held by it to persons holding Northern Securities shares in exchange for shares deposited was permitted. In the state case the United States Circuit Court found that the formation of the Northern Securities did not involve any act or contract in restraint of trade. The real distinction between the two was that while the one court decided that the purchase of a majority of shares in the two companies by a single interest was illegal, the other held that the mere possession of power does not warrant an assumption that such power will be used criminally. This distinction represents the vital point in the case, and really presents the issue on which its determination would finally rest.

THE SUPREME COURT ORDERS DISSOLUTION

Both these cases now went up to the Supreme Court, where they were argued by the best legal ability in the United States. It would be tedious to follow here the conduct of the case, whose importance now is in its relation to the life and work of Mr. Hill. The opinion of the trial court of four justices was sustained by a decision given on March 14, 1904, by the casting vote of a single justice. The Northern Securities Company was ordered to dissolve.

Until the Court's decision was made public, Mr. Hill entertained no doubt that it would be favorable. It was a bitter surprise and disillusionment. That it was adverse struck him no more severely as a checkmate to one of his plans than as a denial of what were to his mind unchangeable principles. He never believed, at this time or later, that the Sherman Anti-Trust Act was intended to apply to railroad corporations. He never accepted the rule that the power to act unjustly is equivalent to the commission of an unjust act.

This decision, of course, created an immense stir and much excitement in the stock market. It required a readjustment from which came more litigation. Eight days after it was rendered Mr. Hill sent out a circular announcing the approaching dissolution of the Northern Securities Company and the distribution of its assets. This circular noted that since the formation of the company the railroads included had extended and improved their facilities, while the rates paid by the public had been materially reduced. It once more declared that the buying of Northern Pacific and Great Northern shares was done "in the full belief that such purchases were in no wise obnoxious to any law of the United States." Since, however, the Court thought otherwise, the company would proceed to comply fully and promptly with its decree. Therefore, 99 per cent. of its capital stock outstanding was called in and canceled.

THE BASIS OF DISTRIBUTION

Immediately there arose a question precipitating a legal struggle on lines similar to the fight for stock control of the Northern Pacific which followed the Burlington purchase. What should the holders of Northern Securities shares receive in exchange for them? Would they get back exactly the same number of shares in the same corporations that they originally deposited, or only their portion of a ratable distribution of all the assets? Mr. Hill and his friends proposed the latter. For each share of Northern Securities surrendered there was to be delivered to the holder $39.27 stock of the Northern Pacific and $30.17 of the Great Northern. To ratify this plan a special stockholders' meeting was held April 21, 1904. At this meeting about 75 per cent. of the stock was voted for the plan. The Harriman

interests had already protested against the proposed scheme of distribution. They had from the beginning been holders of more than $82,000,000 of the stock. This they had received in exchange for the Northern Pacific shares turned in by them in 1901. As they had attempted, in May of that year, to control the Northern Pacific by purchase, so they now attempted to reach the same end by overthrowing the plan of pro rata distribution, and having returned to them, share for share, the stock of that company that they had originally put in.

HILL ON HARRIMAN

On April 2, 1904, the Harriman interests had taken legal measures to enjoin the carrying out of the plan announced. Let Mr. Hill tell some of the preliminaries, in a letter to a trusted friend, where he can give full vent to his honest indignation: "Before closing let me again refer to their statement that they only wanted protection for the Union Pacific. Mr. Harriman was the first director of the Northern Securities Company to whom I went after the decision of the Supreme Court to consult as to how we should dissolve the company, and he immediately said the only thing we could do was a pro rata distribution. This he repeated on several occasions for four or five days, and at the end of that time came to my rooms to tell me that he was afraid he could not carry it out, and the next day he wrote me a personal letter to the same effect, after he had assured me that we would have their full coöperation, and, in the meantime, having had his own counsel present with the Northern Securities counsel in consultation as to the legal steps to be taken; and his counsel agreed fully and said that it was the only legal and moral course that could be pursued under the circumstances. Within ten days from that time they brought the present suit, giving as the reason: 'We know, of course, that Mr. Hill wanted the control of the Northern Pacific, and it would be a great property in his hands, but we wanted to get control of it if we could and we are going to make the effort, because to make the effort would only cost us the lawsuit.' In which case the Great Northern would be hemmed in along the northern boundary without any outlet anywhere except on terms to be made for it, and our property would follow the course of the Alton and other roads like it which were lacking in foresight to protect themselves against what might occur in future."

The Circuit Court unanimously denied the application to intervene. Then came more litigation, whose purpose was the same and whose devious course and voluminous record need not be considered here. An injunction against the distribution plan adopted was granted, and through the usual tortuous legal channels this secondary and final question as to the partition of the estate of the Northern Securities reached the Supreme Court.

All the courts, Circuit, Circuit Court of Appeals, and Supreme Court, held for Mr. Hill. The decision of the last mentioned, unanimously rendered March 6, 1905, in which the plan of the Northern Securities Company for distributing the stock held by it was sustained in every important particular, put a quietus on the trouble makers. It was now free to execute its plan for dissolution, and did so. That Mr. Hill, after the pressure of these years of contest in the courts, neither felt an enduring animosity nor permitted rancor to distort his views or change his attitude toward others is shown in a striking way by a personal letter written two months after the court had spoken its last word. Coming from a man of stern temper and thwarted purpose, who had all along believed and still believed himself right in principle, and who had been opposed at every turn, it is a really notable utterance: "I have told all the Union Pacific people that we should let the past be cast aside, and take every proposition between the two or three systems without any prejudice and consider all interests fairly and honestly, and have peace by each company, regarding at all times the rights of all the others. Where there is a disposition to agree on fair terms there should be no difficulty in securing harmony; and this can only be done where there is no right or disposition to encroach upon or invade each other."

MAN AND HIS MACHINES

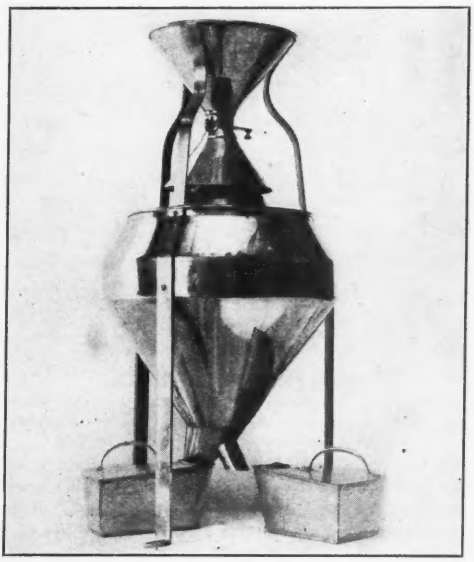
USEFUL INVENTIONS

A "SAFETY FIRST" STEP LADDER

AN EXTENSIBLE step ladder which cannot tip over is a handy device when there are high windows to be cleaned, top shelves to be dusted, or any other odd jobs to be done where it would be precarious to use the ordinary step ladder.

The ladder, which is of wood, resembles the ordinary step ladder, save that it is extensible, has an extra leg at the side, which is folded back when the ladder is not in use, and extended outward when in use, thus forming a tripod which cannot easily be overturned, thereby giving a feeling of security to the person mounted upon it.

A SAFE STEP LADDER
The support on the side renders the danger of the ladder overturning and other like accidents almost negligible



FOR SAMPLING GRAIN AND SEED
A machine designed to secure reliable samples of grain or seed which can also be used for blending unlike materials

A GRAIN SAMPLING MACHINE

USING only the power of gravity, a machine has been constructed which permits grain and seed dealers or laboratory workers to secure reliable samples from large portions of the material to be examined. It can also be used for mixing or blending two or more strains of unlike material, and furthermore a sample can be divided so that one half can be used for testing and grading and the other half turned over to the seller or buyer or retained for future reference.

The device is simple, consisting of a hopper held in position over a cone which is provided at its base with a series of ducts with uniform spaces between them. Adjusted to the bottom of the ducts is a funnel with a spout at its bottom part. The ducts con-

A SANITARY REFUSE CAN—
A lightweight and fly-proof refuse can for the kitchen which the cook can easily—

stitute a passageway from the exterior of the cone to the interior of the funnel. Enclosing the inner funnel is an outside funnel, also with a spout at its base. The upper portion of the outside funnel extends over the ducts and the base of the cone. In operation the material to be separated is placed in the hopper and the valve is opened, allowing the material to fall on the peak of the cone in a circular column. The material spreads on the cone at its base and is divided into sections by the ducts and spaces. As the width of the ducts and spaces are equal, the material is divided into equal parts, one of which goes into one receptacle while the other half flows into a second receptacle.

A CONVENIENT REFUSE CAN FOR THE KITCHEN

A LIGHTWEIGHT refuse can, designed especially for use in the kitchen, facilitates the proper and sanitary disposal of garbage in the kitchen by preventing flies from breeding in the refuse and removing unpleasant odors.

The can, which is made of galvanized non-corrosive metal, has been designed for the convenience of the housewife to take the place of the unhealthful and unprepossessing refuse can in ordinary use. The housewife scrapes the leavings from the plates or other waste matter into the can and closes the airtight cover. When the can is full she carries it out to the garbage can by the bucket-like handle and, while still holding this upper handle, with the other hand she grasps the handle at the back, bringing the upper handle back toward it and, with one finger of the hand holding the upper handle, pulls, like a trigger, the little ring on the top, tilting the can. When the finger releases the cover it drops back into place, and there is thus little danger of getting one's hands soiled.

MAKING DUPLICATE KEYS

AN INGENIOUS machine that cuts accurate duplicate keys from original keys, no matter of what make, has recently been perfected.

The key to be duplicated is placed in one vise and the blank key to be cut in a corresponding vise under the cutting disk. The vise carriage is then brought into such position by means of a lateral-feed hand clutch that the shoulders of both the pattern and blank keys just touch the guide disk and cutter respectively. The lateral-feed clutch on the top of the machine is then thrown, and the vertical feed rod released into action and power applied through the combination hand-crank power wheel on the right of the machine, until the cutter has passed over the entire length of the blank. A duplicate of the pattern key is obtained in about one minute. The machine is designed primarily for hardware dealers and locksmiths, but many hotels, schools, office buildings, and stores are using it with success.

AN ADJUSTABLE EYE GUARD

FOR the use of machinists who have to work at turning lathes, grinding wheels, or other machines where there is always danger of pieces of steel

—THAT IS EASILY EMPTIED
—carry outside and empty into the garbage pail without soiling her hands and spilling the contents

or other material flying up into the eye and permanently injuring the eyesight, a handy adjustable eye guard is now available.

The eye guard is much more convenient than having to wear goggles in doing work, as the inconvenience of having to stop and adjust them to relieve the strain that takes place from the pressure is done away with.

The guard consists of a steel frame enclosing a piece of plate glass reinforced with a large mesh iron wire, and it can be adjusted in a few minutes.

A SIMPLE DEVICE FOR MOISTENING THE AIR IN A ROOM

PHYSICIANS are generally agreed that the majority of colds and the prevalence of la grippe in winter is caused by the overheating of houses with a surplus of dry air due to the use of steam heat. With a view to remedying this defect and moistening the air in steam-heated homes there has appeared an inexpensive humidifier which can easily be hung on the back of the radiator itself.

In the past many insanitary subterfuges have been employed to accomplish this end, such as cups of water and wet rags, but this device consists of a stone (of ground stone and charcoal) that is very absorbent and antiseptic. The bottom of the stone is immersed in a pan of water. The pan is filled by means of a funnel which runs to the top of the stone from the pan. A galvanized frame connects the stone, pan, and funnel. Should the air in the room, however, contain too much water, vapor, or dampness it is absorbed into the stone, as the latter will equalize with the atmospheric condition of the room and not let off vapor when the room is oversaturated.

MAKING DUPLICATE KEYS

A machine that will make duplicate keys from any pattern of key has been found very useful in many hotels and stores

SAVING THE EYES

A guard which is adjusted in a few moments and prevents injury to the eye from flying bits of metal

A NIGHT HAND SIGNAL FOR AUTOMOBILISTS

DURING the daytime drivers of automobiles when turning corners or slowing down are accustomed to extend the hand outside the body of the car, giving warning to other machines behind to slow down also. This signal scheme has proved very effective during the day, but at night in the darkness when a hand could not be seen a substitute had to be devised. An automobilist hit upon the scheme of fastening to the back of the driver's hand, by a piece of elastic, similar to a wrist watch, a small red electric light attached to the dashboard and electric batteries by a fine wire long enough to give free movement to the hand. Surrounding the lamp, which weighs but six ounces and is, therefore, light enough to be worn on the driver's hand at all times and ready for instant use, are the words "Safety First," which shine white.

The driver of the car uses his hand almost automatically at night to signal with, from constant use during the daytime, so that danger signal is sure to avoid many accidents which might easily follow were not such a method employed.

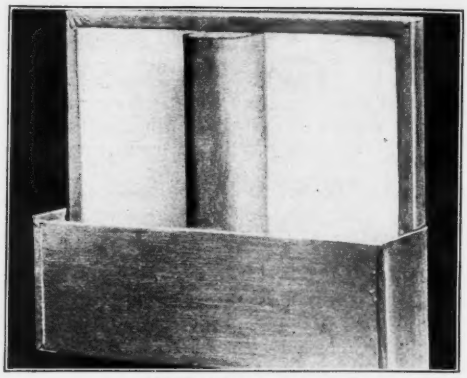
COMPUTING THE PAY ROLL

A MACHINE that combines the operations of a pay-roll paying machine, a pay-roll scheduling machine, and an adding and listing machine is em-

ployed by several manufacturing concerns with a great saving of time and labor. Formerly, in making up a pay roll, after the amount to be paid to each employee had been computed it was necessary to figure out how many coins of each denomination had to be obtained from the bank for each envelope—a long and tedious proceeding. Then when the number of coins of each denomination had been figured out it was necessary to put the correct amount in each envelope, and if a mistake were made one had to open and recount the money in each envelope. Furthermore this method left no positive record of the actual amount paid to each employee.

With the use of the pay-roll machine, after the pay-roll sheets have been made out the total amount is added up, but at the same time that the operator is adding the list the mechanism of the machine is computing the change list automatically, and when the sheet has been added the change list is also completed. This record is immediately transferred to a slip and a check written for the total amount shown on the adding machine, and a list printed on the tape of the amounts to be paid to the various employees.

When the money has been received from the bank it is placed in a coin magazine on the machine and ready to be put into the pay envelopes which have been made out and numbered. As the proper amount goes into each envelope it is printed on the tape and added to the total wheel as before. These printed records are a check for the auditor and safeguard the entire transaction. Furthermore, the amount of time and labor saved in a big corporation employing many hands is tremendous.



MOISTENING THE AIR

Air from which the moisture has been evaporated by steam heat often leads to colds. This device keeps the air in a room uniformly moist

SAFETY NIGHT SIGNAL

During the daytime chauffeurs warn cars behind to slow down by extending the hand. With this device they can do likewise in the dark

SAVING TIME AND LABOR IN COMPUTING THE PAY ROLL

An ingenious adaptation of the adding machine which eliminates much of the drudgery of figuring out and adding the pay roll and avoids mistakes